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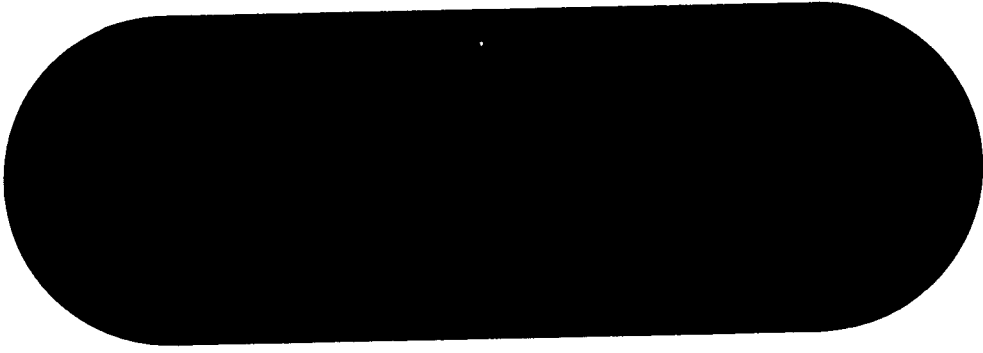
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## SPECIFICATION DOCUMENT PAGE

## LIST OF ACTIVE PAGES

PAGE NUMBER	REVISION LETTER	PAGE NUMBER	REVISION LETTER	PAGE NUMBER	REVISION LETTER	PAGE NUMBER	REVISION LETTER	PAGE NUMBER	REVISION LETTER	PAGE NUMBER	REVISION LETTER
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TITLE PAGE II	N	2	B	23	B	46	B				
REV a	NEW A	3	N	23a	H	47	H				
REV b	NEW B	4	K	24	F	48					
REV c	NEW B	5	N	24a	N	48a	NEW K				
REV d	NEW B	6	D	24b	NEW N	48b	NEW K				
REV e	NEW B	7	B	25		48c	M				
REV f	C	7a	H	26	N	48d	NEW M				
REV g	D	8	H	27	B	48e	NEW M				
REV h	E	8a	H	28		49	L				
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		13	C	34		55	L				
		14	C	35	B	56	B				
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		16	C	37		58	B				
		17	N	38	B	59	NEW B				
		17a	H	39	B	60	NEW B				
		17b	NEW N	40		61	NEW B				
		17c	NEW N	41	B	62	NEW B				
a	N	18		42		63	NEW N				
b	K	19	B	43		64	NEW N				
c	N	20	L	43a	DELETED E	4a	NEW M				
d	NEW M	21	L	44							

PREPARED BY	L. MADDEN	G-4-62	REVISED BY	DCN DATE	DCN LTR.	SPECIFICATION NO.
TYPED BY			JR	3-27-63	M	D10-20403
			R.L.L.	4-30-63	N	
BOEING AIRPLANE COMPANY						PAGE TITLE PAGE II

REV LTR	REVISION		DEV/VAR	REQUESTED	MCR NO.	DRAWN	CHECKED	APPROVED	REL/B-P	REL DATE
	FOLLOW DESCRIPTION OF CHANGE WITH: REASON FOR CHANGE, CHANGE EFFECTIVE INFORMATION, PRODUCTION AND TOOLING INFORMATION, RERUN DDA'S, ETC.									
A	<p>Title Page: Revised List of Active Pages</p> <p>Page Rev. a: Added new revision page.</p> <p>Page 1: Paragraph 1.2.2 deleted</p> <p>Page 1: Paragraph 1.2.4 Eliminated optional provisions</p> <p>Page 6: Paragraph 3.1.1.1.4 - added reference to EAC Drawing 10-20403.</p> <p>Page 6: Paragraph 3.1.1.1.6 - Revised to include components.</p> <p>Page 7: Section 3.1.1.1.9 completely rewritten to define test points</p> <p>Paragraph 3.1.1.1.10 - rewritten to require SCO package</p> <p>Page 7a: New page added (due to rewriting page 7)</p> <p>Page 8: Paragraph 3.1.1.2.4 - rewritten to define wiring specifically.</p> <p>Page 8: Paragraph 3.1.1.2.6 Specified separate ground leads.</p> <p>Page 9: Paragraph 3.1.1.3.2.3 - Changed 95% to 100%</p> <p>Page 13: Sections 3.1.2.2.1 and 3.1.2.2.2 completely rewritten &amp; 14 to define design and performance more completely</p> <p>Page 13: Paragraph 3.1.2.2.2.2 deleted</p> <p>&amp; 14 3.1.2.2.1.2 deleted</p> <p>Page 15: Section 3.1.2.3 - deleted</p> <p>Page 15: Paragraph 3.1.2.4.1 - added sentence on effects of short circuit.</p> <p>Page 16: Paragraphs 3.1.2.6.1.3 &amp; 3.1.2.6.2.3 defined modulation and linearity</p> <p>Page 17: Paragraphs 3.1.2.6.2.6 through 3.1.2.6.2.11 - rewritten to more completely define RF section.</p> <p>Page 17a: New page added (due to rewriting page 17)</p> <p>Page 49: Table I Revised SCO input impedances to read 100K minimum.</p> <p>Revised input voltage Range to read <math>\pm 2.5</math> volts.</p>		VAR	STL (K Hall)	25733	Dilove - D.VIELE	R. Johnson	J. J. Reed	CP 3/16/59	3-16-59
Reason for Change: STL request (3-16-59)										
Change										
Effective: R&D missiles 003, 004, 401 and on										
BOEING AIRPLANE COMPANY SEATTLE 14, WASHINGTON			MODEL WS-133A	NO. D10-20403	PAGE REV.					

REV LTR	REVISION		DEV/VAR	REQUESTED	MCR NO.	DRAWN	CHECKED	STRESS	APPROVED	REL/B-P	REL DATE	
	FOLLOW DESCRIPTION OF CHANGE WITH: REASON FOR CHANGE, CHANGE EFFECTIVE INFORMATION, PRODUCTION AND TOOLING INFORMATION, RERUN DDA'S, ETC.											
0	Page 8a,	Paragraph 3.1.1.2.7, Changed to read "A bonding strap shall be used", etc., in lieu of "a bonding strap may be used", etc.	See Page Rev. f									
	Page 13,	Paragraph 3.1.2.2.2, Replaced "3.1.2.4.2.1" with "3.1.2.1.1.3".										
	Page 13,	Paragraph 3.1.2.2.2.1, Replaced "47%" with "94%"										
	Page 16,	Paragraph 3.1.2.6.2 Deleted "and section 3.1.2.3.1"										
	Reason for Change: Engineering error											
	Title Page I: Deleted list of Active pages, added reference to Title Page II for Active Page list, added Reliability Group Signature.											
	Title Page II: Added new Title Page with complete list of Active Pages.											
	Page Rev b, c, d & e: Added new revision pages.											
	Revised table of contents page "a" to list flight proof tests for 10-20403-1 on page 24a in lieu of page 24.											
	Page c,	Revised index page to include Figure 7, 8, 9 and 10; changed titles of Figures 5 and 6.										
	Page 1,	Paragraph 1.2.2, added new paragraph for mixer circuitry.										
	Page 1,	Paragraph 1.2.3, changed to read "subcarrier mixer output" in lieu of "subcarrier mixer amplifier output"										
	Page 3,	Paragraph 2.1.1, Deleted reference to MIL-E-8109B										
	Page 4,	Paragraph 2.1.3, Deleted reference to AF Bulletin 67B (cancelled)										
	Page 4,	Paragraph 2.2, Added sentence "Where conflicting requirements exist", etc.										
	Page 4,	Paragraph 2.2.1, deleted reference to Subcontractor Status Report Document DM-1011, added reference to Work Statement Document D2-3971.										
	Page 5,	Paragraph 3.1.1.1.2.1, Critical Materials, deleted all										
	Page 6,	Paragraph 3.1.1.1.6, deleted all after first sentence, added sentence "See paragraph 3.1.1.5.3", etc.										
	Page 7,	Paragraph 3.1.1.1.6 (Cont'd) deleted from this page due to revision immediately above.										
	Page 7,	Paragraph 3.1.1.1.7, Between 2nd and 3rd sentences inserted new sentence "The subcarrier oscillator section .....units".										
	Page 8,	Paragraph 3.1.1.2.6, Re-written to detail grounding requirements.										
	Page 8a,	New page added for paragraph 3.1.1.2.7 and section 3.1.1.3 due to revision immediately above.										
	Page 10,	Paragraph 3.1.1.5. Last sentence, changed "Mixer Amplifier" to read "Mixer".										
	Page 11,	Paragraph 3.1.1.5.2, Last sentence, deleted all after "Vendor".										
	Page 11,	Paragraph 3.1.1.5.3, added new paragraph for Part Number Changes.										
	Page 11a,	New page added for paragraph 3.1.2.1.1.4 due to new paragraph 3.1.1.5.3.										
BOEING AIRPLANE COMPANY SEATTLE 14, WASHINGTON			MODEL NO. D10-20403		PAGE Rev. b							



REV LTR	REVISION		DEV/VAR	REQUESTED	MCR NO.	DRAWN	CHECKED	STRESS	APPROVED	REL/B-P	REL DATE	
	FOLLOW DESCRIPTION OF CHANGE WITH: REASON FOR CHANGE, CHANGE EFFECTIVE INFORMATION, PRODUCTION AND TOOLING INFORMATION, RERUN DDA'S, ETC.											
B	Page 12,	Paragraph 3.1.2.1.1.4 (Cont'd) deleted due to addition of new page 11a.	See Page Rev. 4									
	Page 12,	Paragraph 3.1.2.1.2.4, Deleted "qualification"										
	Page 13,	Paragraph 3.1.2.2.2.1, substituted "Upper limit" for "f <sub>1</sub> " and "lower limit" for "f <sub>2</sub> ".										
	Page 15,	Paragraph 3.1.2.2.2.11, Re-worded for clarity.										
	Page 15,	Paragraph 3.1.2.3, Added new paragraph for mixer section requirements.										
	Page 17,	Paragraphs 3.1.2.6.2.4 and 3.1.2.6.2.5 moved to page 16 due to revision of paragraph 3.1.2.6.2.2.										
	Page 17,	Paragraph 3.1.2.6.2.6, Included center frequency tolerance as part of stability requirement.										
	Page 17,	Paragraph 3.1.2.6.2.7, Defined center frequency.										
	Page 19,	Paragraph 4.1.2.2, Deleted "at no additional cost to the Buyer".										
	Page 21,	Paragraph 4.3.1.3, Re-written to reference Figure 9 for vibration envelope requirements.										
	Page 23,	Paragraph 4.5.1.4, Re-written to more clearly define the temperature-altitude test.										
	Page 23,	Para. 4.5.1.4.1 re-numbered to 4.5.1.4.2 due to revision immediately above.										
	Page 23a,	New page added new for 4.5.1.6 due to re-writing 4.5.1.4.										
	Page 23a,	Para. 4.5.1.6, Re-written to detail the interference tests.										
	Page 27,	Para. 4.7.3, added new para. for Evidence of Acceptance test.										
	Page 31,	Para. 6.1.1, External cooling provisions deleted; para. re-written to more clearly describe conditions during operating life.										
	Page 32,	Para. 6.2.1, changed "6.4.3" to read "D2-3971" "Design proposal submitted" changed to read "design proposal information submitted".										
	Page 35,	Para. 6.3.10, Re-worded to more completely define reliability.										
	Page 38,	Para. 6.4.3.1.3, Proposal Revisions, deleted all.										
	Page 38,	Para. 6.4.3.1.5, Quotation Program Schedule, deleted all.										
	Page 39,	Paragraphs 6.4.3.2.1 to 6.4.3.2.5 inclusive which required reliability program, outline drawings, schematics, cutaway drawings and brochure deleted. Reference made to D2-3971 for list of specific exhibits required.										
	Page 41,	Para. 6.4.4.3, Installation and Maintenance Instructions requirements, deleted all.										
	Page 41,	Paragraph 6.4.4.4, Production Drawings requirements re-written.										
	Page 46,	Para. 6.6.1, Request for Quotation re-worded.										
	Page 46,	Para. 6.6.2, Deleted reference to para. 6.4.3 in lieu of D2-3971, Paragraph re-worded.										
	Page 46,	Para. 6.6.3, Deleted last sentence.										
	Page 46,	Para. 6.6.4, Firm Quotation, deleted all.										
	Page 46,	Para. 6.6.5, Purchase Order, re-worded.										
BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON			MODEL	NO. D10-20403				PAGE Rev. C				

REV LTR	REVISION		DEV/VAR	REQUESTED	MCR NO.	DRAWN	CHECKED	STRESS	APPROVED	REL/B-P	REL DATE
	FOLLOW DESCRIPTION OF CHANGE WITH: REASON FOR CHANGE, CHANGE EFFECTIVE INFORMATION, PRODUCTION AND TOOLING INFORMATION, RERUN DDA'S, ETC.										
B	<p>Page 47, Para. 6.6.7, Deleted "subject to proprietary restrictions stipulated by the Vendor", in (a) deleted "Detail" and added "per 6.4.4.4", in (c). Added "Program" and added (e) "Interference Control" etc.</p> <p><u>Reason for Change:</u> Clarification of Specification</p> <p>Page a, Table of contents, changed page "24" to "24a"</p> <p>Page c, Added Figure 10, Shock test spectrum</p> <p>Page 1, Para. 1.2.3, Deleted "or as an alternate, the R.F. amplification may be incorporated within the transmitter unit."</p> <p>Page 2, Para. 1.2.6, Added first sentence "Each complete system .... supply". and substituted "these" for "the above".</p> <p>Page 3, Para. 2.1.1, added reference to MIL-F-14072 and MIL-E-5400C for grouping and usage of dissimilar metals.</p> <p>Page 4, Para. 2.1.4, Deleted reference to MS33506 for grouping and usage of dissimilar metals.</p> <p>Page 4, Para. 2.2.1, added reference to Finish Document D2-4051.</p> <p>Page 6, Para. 3.1.1.1.2.3, Revised to require finishes in accord with D2-4051, in lieu of "dictated by the metals used" and subject to BAC approval.</p> <p>Page 6, Para. 3.1.1.1.2.4, New para. added requiring grouping and usage of dissimilar metals in accord with MIL-F-14072 and MIL-E-5400C.</p> <p>Page 6, Para. 3.1.1.1.4, Revised para. heading to read "Maintainability" in lieu of "Maintenance Convenience" added sentence "Maintainability shall be considered" etc.</p> <p>Page 7, Para. 3.1.1.1.9 added requirement for DC test receptacle.</p> <p>Page 7, Para. 3.1.1.1.10, Moved to page 7a to gain space. Also deleted 2nd sentence "Space provisions must be made within the envelope to replace the subcarrier oscillator package with a package of ten subcarrier oscillators without change to the RF and high voltage power supply sections"</p> <p>Page 8, Para. 3.1.1.2.3, Changed to read "shall be TNC type in lieu of "shall be TNC King Electronics Type".</p> <p>Page 8, Para. 3.1.1.2.6, Substituted "the RF chassis" for "case" and "leads" for "terminals (leads)".</p> <p>Page 10, Para. 3.1.1.3.2.6, Revised to read "140 db" in lieu of "156 db" replaced "between 150 cps to 300 cps for 180 seconds" with "below 300 cps". Deleted last sentence about acoustic noise effects being covered by vibration and acceleration requirements of 3.1.1.3.2.2 and 3.1.1.3.2.5.</p> <p>Page 10, Para. 3.1.1.3.2.7, Deleted last sentence about angular oscillation excitation being covered by vibration and acceleration requirements of 3.1.1.3.2.2 and 3.1.1.3.2.5.</p> <p>Page 10, Para. 3.1.1.4.1, changed to read "4.0 minutes" in lieu of "3.5" minutes.</p>		See Page Rev. f								
BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON			MODEL	NO.				PAGE			
				D 10 - 20403				Rev. d			

REV LTR	REVISION		DEV/VAR	REQUESTED	MGR NO.	DRAWN	CHECKED	STRESS	APPROVED	REL/B-P	REL DATE
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B	<p>Page 10, Para. 3.1.1.5, in last sentence deleted "mixer" and added "two".</p> <p>Page 11a, Para. 3.1.2.1.1.5, New para. added for transient potentials.</p> <p>Page 13, Para. 3.1.2.2.1.1, changed to read "+5.0 volts" in lieu of "+2.5 volts" for <math>F_1</math>, "zero volts" in lieu of "-2.5 volts" for <math>f_2</math> "<math>\pm 0.0050</math> volts" in lieu of "<math>\pm 0.0025</math> volts" for <math>f_1</math> and <math>f_2</math>.</p> <p>Page 13, Para. 3.1.2.2.2.1, inserted phrase "when 8 times the rated positive input voltage is applied, i.e.," and deleted negative voltage requirements. Also added sentence requiring voltage limiters.</p> <p>Page 14, Para. 3.1.2.2.2.3, Revised to read "0 or +5" in lieu of "<math>\pm 2.5</math>".</p> <p>Page 14, Para. 3.1.2.2.2.6, Revised to read "0 to +5" in lieu of "<math>\pm 2.5</math>".</p> <p>Page 15, Para. 3.1.2.4.1.2, Revised to read "1.00%" in lieu of "0.05%".</p> <p>Page 15, Para. 3.1.2.4.2, added provisions for short circuit isolation.</p> <p>Page 16, Para. 3.1.2.5.1.2, Revised to read "1.00%" in lieu of "0.05%" and added sentence "The primary...cords"</p> <p>Page 16, Para. 3.1.2.5.2, added 2nd sentence "The high voltage power supply....or circuit breakers".</p> <p>Page 16, Para. 3.1.2.6.2.2, Deleted requirement for reducing power output to 5 watts.</p> <p>Page 16, Para. 3.1.2.6.2.4, Revised to specify antenna conducted radiation &amp; added radiation requirements in the receiver passbands.</p> <p>Page 22, Para. 4.5.1, added "and shock".</p> <p>Page 22, Para. 4.5.1.2, Revised to require simultaneous random and sinusoidal vibrations per Figure 5 and 6 in lieu of sinusoidal vibration followed by random vibration per Figures 5 and 6.</p> <p>Page 24, Para. 4.5.1.7, Rewritten to reference Figures 9 and 10 and to more clearly define the reliability test.</p> <p>Page 24a, New page added for para. 4.5.2 due to rewriting of para. 4.5.1.7.</p> <p>Page 24a, Para. 4.5.1.8, New para. added for other environmental tests such as sand and dust, salt spray, etc.</p> <p>Page 24a, Para. 4.5.1.9, Added new para. for shock test.</p> <p>Page 49 Table 1, revised input voltage range to read "0 to +5" volts in lieu of "<math>\pm 2.5</math>"; tolerance on input impedance specified, and preference for higher nominal input impedance stated.</p> <p>Page 55, Figure 3, Optional provision for Regulator removed in two places, power flow vector from regulator to mixer removed in two places.</p> <p>Page 56, Figure 4, revised vibration envelope to read 0.4 double amplitude 5-16 cps, <math>\pm 5G</math> 16-50 cps, <math>\pm 2G</math> 50-300 cps in lieu of <math>\pm 4G</math> 5-14 cps, <math>\pm 5G</math> 16-112 cps, <math>\pm 10G</math> 160-600 cps.</p> <p>Page 57, Figure 5, Added ".000025 EA" and substituted "15.8 cps" for "15.7 cps".</p> <p>Page 58, Figure 6, Revised curve: <math>G^2/cps</math> was 0.2 from 75 to 2000 cps.</p>		See Page Rev. 1								
BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON			MODEL	NO.		PAGE					
				D10-20403		Rev.					

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B	<p>Page 59, Figure 7, New, vibration envelope added for acceptance tests.</p> <p>Page 60, Figure 8, New, Shock test spectrum added.</p> <p>Page 61, Figure 9, New, Simulated Flight Environment, Sinusoidal vibration.</p> <p>Page 62, Figure 10, New, Simulated Flight Environment, Random vibration.</p> <p><u>Reason for Change:</u> Completion of Basic Design</p>		VAR	W.G. FREDERICK	PRR 9500	RICK URBAN	ED HARTMAN 7/11/59	W. J. J. 7/17/59
Revision B Changes Effective: R&D Missiles 003, 004, 401 - 434								
C	<p>Page 4, Para. 2.2.3, Added reference to letter designating center frequencies to document list.</p> <p><del>Page 6, Para. 3.1.1.2.3, Changed cannon type DA or DE connectors to type.</del></p> <p>Page 8, Para. 3.1.1.2.3, Revised to read "type DAD or DED" in lieu of "type DA or DE" and "type TNC or TM" in lieu of "TNC type".</p> <p>Page 8, Para. 3.1.1.2.6 (a), Added statement indicating use of transformer to provide DC isolation.</p> <p>Page 11a, Para. 3.1.2.1.1.4, Revised to allow RF tuning control to be accessible for adjustment after assembly of the unit.</p> <p>Page 13, Para. 3.1.2.2.1.1, Revised to read "<math>f_2</math>-<math>f_1</math>" in lieu of "<math>f_1</math>-<math>f_2</math>". Deleted abbreviations for <math>df_1</math> and <math>df_2</math>.</p> <p>Page 13, Para. 3.1.2.2.2.1, Completely revised para. to replace frequency deviation limit requirements with requirements for SCO adjacent band edge attenuation.</p> <p>Page 14, Para. 3.1.2.2.2.7, Revised to read "<math>f_2</math> to <math>f_1</math>" in lieu of "<math>f_1</math> to <math>f_2</math>". Revised to allow output voltage of SCO to vary 25% in lieu of 10%.</p> <p>Page 15, Para. 3.1.2.4.2, Revised to read "across the power terminals within an SCO" in lieu of "across the regulator unit output terminals feeding a particular SCO".</p> <p>Page 16, Para. 3.1.2.6.1.1, Deleted requirement for flexibility of RF amplification provisions as regards to adjusting to center frequencies.</p> <p>Page 16, Para. 3.1.2.6.2.1, Revised to clarify lead impedance requirements.</p> <p>Page 16, Para. 3.1.2.6.2.2, Revised to read "shall not exceed 17 watts" in lieu of "shall not exceed 15 watts".</p> <p>Page 16, Para. 3.1.2.6.2.4, Deleted receiver passband "8.0-9.5 Kmc".</p> <p>Page 17, Para. 3.1.2.6.2.7, Revised to add reference number of confidential letter designating the assigned center frequency.</p> <p>Page 13, Para. 3.1.2.2.1.3, Added new para. to specify frequency modulation requirements.</p>	SEE REV. PAGE G						
BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON			MODEL	NO.	DIO-20403		PAGE	Rev. f

REV LTR	REVISION	DEV/VAR	REQUESTED	MCR NO.	DRAWN	CHECKED	STRESS	APPROVED	REL/B-P	REL DATE
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C	<p>Page 17, Para. 3.1.2.6.2.8, Revised paragraph to replace <math>\pm 7.5 \pm 1</math> kc with <math>\pm 4 \pm 1</math> kc, <math>\pm 8.0 \pm 1</math> kc with <math>\pm 6 \pm 1</math> kc, <math>\pm 21 \pm 2.5</math> kc with <math>\pm 11 \pm 1</math> kc, <math>\pm 30 \pm 3</math> kc with <math>\pm 27 \pm 3</math> kc, and <math>\pm 46 \pm 5</math> kc with <math>\pm 64 \pm 7</math> kc.</p> <p>Page 17a, Para. 3.2.1, Revised to add reference number of confidential letter designating the assigned center frequency.</p> <p>Reason for Change: Completion of basic design and clarification of specification.</p> <p>Revision C Changes Effective: R&amp;D Missiles 003,004,401-434.</p>	VAR.	W.G. FREDERICK	PRR 9500	A. HUBBY	8-17-59	W. J. L. 2-10-59	W. J. L. 8/26/59	10/1/59	10/1/59
D	<p>Title Page II, Revised list of active pages.</p> <p>Rev. Page g, Added Revision D to the revision page.</p> <p>Page 4, Para. 2.2.1, added ref. to B&amp;C Document D2-4751.</p> <p>Page 6, Paragraph 3.1.1.1.5, added to end of paragraph "as noted above".</p> <p>Page 8, Paragraph 3.1.1.2.5, added to end of paragraph "whenever design permits".</p> <p>Page 15, Para. 3.1.2.4.1 Deleted current monitoring provisions</p> <p>Page 15, Para. 3.1.2.5.1 Deleted current monitoring provisions</p> <p>Page 43a, Added page 43a, Paragraph 6.4.6, Photographic Coverage.</p> <p>Page f,g Corrected effectivity of Rev. B&amp;C to "401 to 434"</p> <p>Reason for Change: Completion of basic design and Air Force requirement on photographic coverage.</p> <p>Change Effective: R &amp; D Missiles 003,004,401-434.</p>	DEV	W.G. FREDERICK	PRR 9500	F. M. 49	D. MOS 10-5-59	W. J. L. 10-5-59	W. J. L. 10/18/59	10/19/59	10/19/59
BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON		MODEL	NO. D10-20403				PAGE Rev. g			

REV LTR	REVISION		DEV/VAR	REQUESTED	MCR NO.	DRAWN	CHECKED	STRESS	APPROVED	REL/REP	REL DATE
	FOLLOW DESCRIPTION OF CHANGE WITH: REASON FOR CHANGE, CHANGE EFFECTIVE INFORMATION, PRODUCTION AND TOOLING INFORMATION, RERUN ODA'S, ETC.										
E	<p>Title Page I, added new change letter "E".</p> <p>Title Page II, added change letters to revised pages list  Page 4, *Para. 2.2.1, deleted D2-4751.  Rev. Page h, New page added for change "E" description.  Page 7a, Para. 3.1.1.2.3, added Power Supply and Power Amplifier Connector information. Paragraph removed from Page 8 and added to Page 7a.  Page 8, Para. 3.1.1.2.3, removed paragraph from page 8 and added to page 7a.  Page 11, Para. 3.1.2.1.1.3, added maximum ripple requirement. Changed "DC battery power source" to "DC power system".  Page 11a, Para. 3.1.2.1.1.5, deleted "due to switching auxiliary power supplies". Changed "40 volts" transient potential to "28±12 volts".  Page 11a, Para. 3.1.2.1.1.6, added new paragraph for overvoltage and undervoltage protection.  Page 43a, *Deleted page. Photographic coverage, Para. 6.4.6, no longer a requirement.</p> <p>Reason for Change: Clarification of specification. Vendor request, equipment is in accord.</p> <p>*To reduce scope of photography requirements.</p> <p>Change Effective:</p> <p>SA01 &amp; on  SB01 &amp; on  SC01 &amp; on  SD01 &amp; on  SE01 &amp; on  SF01 &amp; on  SG01 &amp; on  AB01 &amp; on  AC01 thru AC-17  AD01 thru AD-13  AE01 thru AE04</p>		<p>VARIATION</p> <p>R.F. SWANBERG</p> <p>PRR 9500 (TM NO. 49-1 * REF)</p> <p>A. HUSBY 3-19-60</p> <p>Donald D. Lane 3-25-60</p> <p>3/23/60</p> <p>3-24-60</p> <p>3-24-60</p>								
<p>BOEING AIRPLANE COMPANY  SEATTLE 24, WASHINGTON</p>			<p>MODEL</p>	<p>NO.</p> <p>D10-20403</p>				<p>PAGE</p> <p>Rev. h</p>			

REV LTR	REVISION		DEV/VAR	REQUESTED	MCR NO.	DRAWN	CHECKED	STRESS	APPROVED	REL/B-P	REL DATE
	FOLLOW DESCRIPTION OF CHANGE WITH: REASON FOR CHANGE, CHANGE EFFECTIVE INFORMATION, PRODUCTION AND TOOLING INFORMATION, RERUN DDA'S, ETC.										
F	<p>Title Page I, added change letter "F".</p> <p>Title Page II, added change letter "F" to list of active pages.</p> <p>Rev. Page 1, new page added for Rev. "F" description</p> <p>Page 24, Paragraph 4.5.1.7 Replaced "Demonstration of satisfactory reliability will be completed when the systems have operated for 80 cycles each with no discrepancy or 150 cycles each with a total of no more than one discrepancy, or 205 cycles each with a total of no more than two discrepancies" with "Demonstration of satisfactory reliability will be completed when one system has operated for 75 cycles with no discrepancy".</p> <p>Reason for change: Program cost reduction.</p> <p>Change effective: SA01 &amp; on, SB01 &amp; on, SC01 &amp; on, SD01 &amp; on, SE01 &amp; on, SF01 &amp; on, SG01 &amp; on, AH01 &amp; on, AC01 thru AC17, AD01 thru AD13, &amp; AE01 thru AE04.</p>		VARIATION	R.F. SWANBERG 2-6228	PRR 9500	A. HUSBY 4-11-60	Drawn 4-11-60		4/14/60	4-13-60	
<p>BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON</p>			MODEL	NO.		PAGE					
				D10-20403		Rev. 1					

REV LTR	REVISION	DEV/VAR	REQUESTED	WCP NO.	DRAWN	CHECKED	STRENGTH	APPROVED	REL'D	REL DATE
	FOLLOW DESCRIPTION OF CHANGE WITH: REASON FOR CHANGE, CHANGE EFFECTIVE INFORMATION, PRODUCTION AND TOOLING INFORMATION, RERUN ODA'S, ETC.									
G	<p>Title Page, added change letter "G".</p> <p>Title Page II, indicated revised pages.</p> <p>Rev. Page j, description of Rev. G changes.</p> <p>Page a, added -2 and -3 to index.</p> <p>Page c, added -2 and -3 to figure index.</p> <p>Page 1, Paragraphs 1.1 and 1.2, added references to -2 and -3 systems.</p> <p>Page 4, Paragraph 2.2.1, added D2-4862 to Publications listing.</p> <p>Page 5, Paragraph 3.1, changed "10-20403" to "10-20403 &amp; -2".</p> <p>Page 17, Paragraph 3.2, changed "10-20403-1" to "10-20403-1 &amp; -3".</p> <p>Page 20, Paragraph 4.3.1, changed "10-20403 &amp; 10-20403-1" to "10-20403, -1, -2, and -3".</p> <p>Page 21, Paragraph 4.3.2, same as change to Paragraph 4.3.1.</p> <p>Paragraph 4.4.1, changed "10-20403" to "10-20403 &amp; -2".</p> <p>Paragraph 4.4.2, changed "10-20403-1" to "10-20403-1 &amp; -3".</p> <p>Page 24a, Paragraph 4.5.2, changed "10-20403-1" to "10-20403-1, -2 and -3".</p> <p>Page 26, Paragraph 4.6.2, changed "10-20403 &amp; 10-20403-1" to "10-20403, -1, -2 and -3". Added functional test document number, D2-4862.</p> <p>Page 31, Paragraph 6.1, changed "10-20403 and 10-20403-1" to "10-20403, -1, -2 and -3".</p> <p>Page 49, Table I, same change as Paragraph 6.1.</p> <p>Page 55, Figure 3, changed "10-20403" to "10-20403 or -2" and "10-20403-1" to "10-20403-1 or -3".</p> <p>Reason for Change:</p> <p>PRR 1544 STL request for removal of test connector dust cap chain.</p> <p>PRR 1561 Provide for more positive mating of DPG connectors.</p> <p>PRR 1563 Provide for more positive mating of DED connectors.</p> <p>Effectivity: EWA 3019, AD01 &amp; ON, AC04, AD01 &amp; ON.</p>	VARIATION	D.O. LOVE 2-6228	PRR 1544, 1561, & 1563	A. H. EY 9-7-62					
BOEING AIRPLANE COMPANY		MODEL	NO.	PAGE						
		WS-133A	D10-20403	REV. J						



REV LTR	REVISION		DEV/VAR	REQUESTED	MCR NO.	DRAWN	CHECKED	STRESS	APPROVED	REL B-P	REL DATE
	FOLLOW DESCRIPTION OF CHANGE WITH: REASON FOR CHANGE, CHANGE EFFECTIVE INFORMATION, PRODUCTION AND TOOLING INFORMATION, RERUN ODA'S, ETC.										
H	<p>Title Page, added change letter "H" and date.  Title Page II, indicated revised pages.  Rev. Page K, description of Rev. H changes.</p> <p>Page 4, Paragraph 2.2.1, deleted "D2-2444" and added "GM 07-59-2617A."  Paragraph 2.2.3, corrected "2-4446-8-316" to read "2-4446-8-216."</p> <p>Page 7a, Paragraph 3.1.1.2.1, changed "D2-2444" to "GM 07-59-2617A."</p> <p>Page 8, Paragraph 3.1.1.2.6, changed "D2-2444, paragraph 3.2.2.1" to "GM 07-59-2617A, paragraph 3.2.9."</p> <p>Page 8a, Paragraph 3.1.1.2.7, changed "D2-2444" to "GM 07-59-2617A."</p> <p>Page 11, Paragraph 3.1.2.1.1.3, changed last sentence "The maximum current shall not exceed 4.0 amperes" to "The maximum current shall not exceed 4.25 amperes under all operating conditions except for 2:1 and 5:1 VSWR load conditions where a maximum current of 4.5 amperes is allowable."</p> <p>Page 17, Paragraph 3.1.2.6.2.7, corrected "2-4446-8-316" to read "2-4446-8-216."</p> <p>Page 17a, Paragraph 3.2.1, corrected "2-4446-8-316" to read "2-4446-8-216."</p> <p>Page 23a, Paragraph 4.5.1.6, changed "D2-2444" to "GM 07-59-2617A."</p> <p>Page 47, Paragraph 6.6.7, changed "D2-2444" to "GM 07-59-2617A."</p> <p>Reason for Change:  (a) To increase maximum allowable system current per BMC authorization (Letter 2-6311-4/6A dated 3-8-1).  (b) BMD/BMC/STL direction to replace MIL-I-26600 with GM 07-59-2617A as specification for RFI testing of WS-133A equipment (CCP 354).</p> <p>Effectivity:  SAO1 thru SG01, ABO2, ABO4, ABO5, ABO9, EWA 3019, ADO4 thru AD23, and AEO1 thru AEO6.</p>		VARIATION	D.O. LOVE 2-6312	PRR 9500	A. HUSBY 3-13-61	<i>2/11/61</i> 3-13-61	R. D. Love 3-13-61			
BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON			MODEL	NO.	PAGE						
WS-133A				D10-20403	REV. k						

REV LTR	REVISION		DEV / VAR	REQUESTED	INCR NO.	DRAWN	CHECKED	STRESS	APPROVED	REL'D/P	REL DATE
	FOLLOW DESCRIPTION OF CHANGE WITH: REASON FOR CHANGE, CHANGE EFFECTIVE INFORMATION, PRODUCTION AND TOOLING INFORMATION, RERUN DDA'S, ETC.										
H	<p>Title Page, added change letter "H" and date.  Title Page II, indicated revised pages.  Rev. Page K, description of Rev. H changes.  Page 4, Paragraph 2.2.1, deleted "D2-2444" and added "GM 07-59-2617A."  Paragraph 2.2.3, corrected "2-4446-8-316" to read "2-4446-8-216."  Page 7a, Paragraph 3.1.1.2.1, changed "D2-2444" to "GM 07-59-2617A."  Page 8, Paragraph 3.1.1.2.6, changed "D2-2444, paragraph 3.2.2.1" to "GM 07-59-2617A, paragraph 3.2.9."  Page 8a, Paragraph 3.1.1.2.7, changed "D2-2444" to "GM 07-59-2617A."  Page 11, Paragraph 3.1.2.1.1.3, changed last sentence "The maximum current shall not exceed 4.0 amperes" to "The maximum current shall not exceed 4.25 amperes under all operating conditions except for 2:1 and 5:1 VSWR load conditions where a maximum current of 4.5 amperes is allowable."  Page 17, Paragraph 3.1.2.6.2.7, corrected "2-4446-8-316" to read "2-4446-8-216."  Page 17a, Paragraph 3.2.1, corrected "2-4446-8-316" to read "2-4446-8-216."  Page 23a, Paragraph 4.5.1.6, changed "D2-2444" to "GM 07-59-2617A."  Page 47, Paragraph 6.6.7, changed "D2-2444" to "GM 07-59-2617A."</p> <p>Reason for Change:  (a) To increase maximum allowable system current per BMC authorization (Letter 2-6311-4/6A dated 3-8-1).  (b) BMD/BMC/STL direction to replace MIL-I-26600 with GM 07-59-2617A as specification for RFI testing of WS-133A equipment (CCP 354).</p> <p>Effectivity:  SA01 thru SG01, ABO2, ABO4, ABO5, ABO9, EWA 3019, AD04 thru AD23, and AEO1 thru AEO6.</p>		VARIATION	D.O. LOVE 2-6312	PRR9500	A. HUSBY 3-13-61	<i>Matthews</i> 3-13-61	B. D. Love 3-13-61			
BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON			MODEL WS-133A	NO. D10-20403		PAGE REV. k					

REV LTR	REVISION		DEV/VAR	REQUESTED	MCR NO.	DRAWN	CHECKED	STRESS	APPROVED	REL/B-P	REL DATE
	FOLLOW DESCRIPTION OF CHANGE WITH: REASON FOR CHANGE, CHANGE EFFECTIVE INFORMATION, PRODUCTION AND TOOLING INFORMATION, RERUN DDA'S, ETC.										
J	<p>Title Page I, added change letter "J" and date.  Title Page II, indicated revised pages.  Page 1 (Rev.), description of changes.  Page 26, Paragraph 4.6.2 completely revised to include functional test information for each dash number.</p> <p>Reason for change: To clarify functional test requirements.</p>		Variation	D. Love	PRR 9500	A. Husby					
K	<p>Title Page I, added change letter "K" and date.  Title Page II, indicated revised pages.  Rev. Page 1, description of changes.  Page b, added "6.7 Specification Waivers."  Page 48a, 48b, 48c, new pages adding para. 6.7.  Page 4, Added Boeing letter reference under "correspondence".  Reason for change: To include description of RFI waiver.  PROD. INFO. VENDOR IN ACCORD</p>		VAR	D. LOVE 2-6432	PRR 9500	A. HUSBY 6-6-62					
L	<p>Title Page I, added Revision Letter L  Title Page II, added Revision Letter L  Revision Page 1; described the Revision L changes  Page a, added -10 and -11 Specification Numbers  Page c, added -10 and -11 Specification Number  Page 1, describe -10 and -11 systems  Page 5; added -10 Specification Number  Page 17, added -11 Specification Number  Page 20, added -10 and -11 Specification Numbers  Page 21, added -10 and -11 Specification Numbers  Page 24a, describe the applicable preproduction Test Requirements for -10 and -11 systems.  Page 26, added -10, -11, -12 and -13 Specification Numbers  Page 31, added -10 and -11 Specification Numbers  Page 49, added -10 and -11 Specification Numbers  Page 55, Added -10 and -11 Specification Numbers</p> <p>Reason for change: To assign new part numbers for the improved RF Sections.</p>		DE VARIATION	W. G. F. 2-6422	PRR 9500	E. R. D. 2-6422					
M	<p>Title Page I, added Revision Letter "M".  Title Page II, added Revision Letter "M".  Revision Page 1; described Revision "M" change.  Page d, new page; added list of Material page.  Page 4a, new page; added Boeing correspondence.  Page 48c, added para. 6.7.2.  Pages 48d and 48e, new pages; added para. 6.7.2.</p> <p>Reason for Change: To show final approval status of FM/FM Telemetry Equipment. Per ACN 2674</p>		VARIATION	D. O. LOVE	PRR 9500	J. ROMBERG					
<p>BOEING AIRPLANE COMPANY  SEATTLE 24, WASHINGTON</p>			MODEL	NO.		PAGE					
<p>WS-133</p>			D10-20403		Rev. 1						

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	FOLLOW DESCRIPTION OF CHANGE WITH: REASON FOR CHANGE, CHANGE EFFECTIVE INFORMATION, PRODUCTION AND TOOLING INFORMATION, RERUN DDA'S, ETC.									
N	<p>Title Page added Revision Letter "N"</p> <p>Title Page II, Revised list of active pages.</p> <p>Revision Page m, described Revision N changes.</p> <p>Page a, Para 3.1 revised to delete "&amp; -10".</p> <p>Para 3.2 revised to delete "&amp; -11".</p> <p>Added para. 3.3 "Design Requirements for 10-20403-10".</p> <p>Added para. 3.4 "Design Requirements for 10-20403-11".</p> <p>Page c, added Figures 11 and 12 to Index.</p> <p>Page 1, corrected FM/FM telemetry system part number to (10-20403-1, -2, -3, -10 and -11).</p> <p>Page 3, Added MIL-D-70327 to Specifications, Military.</p> <p>Page 5, Deleted -10 from Section 3.1.</p> <p>Page 17, Deleted -11 from Section 3.2.</p> <p>Page 17b, New Page, Design Requirements for 10-20403-10.</p> <p>Page 17c, New Page, Design Requirements for 10-20403-10. &amp; -11</p> <p>Page 24a, Deleted Paragraph 4.5.3</p> <p>Page 24b, New Page, Paragraph 4.5.3 Preproduction Tests for 10-20403-10 &amp; -11.</p> <p>Page 26, Paragraph 4.6.2, Changed references from D2-4862 to applicable paragraphs of D2-4862-1.</p> <p>Page 63, New Page, added Figure 11.</p> <p>Page 64, New Page, added Figure 12.</p> <p>Reason for Change: To include revised vibration requirements for -12 &amp; -13. To separate WS133A system (-2 &amp; 3) requirements from WS133B system (-10 &amp; -11) requirements for clarification of subsequent revisions.</p> <p>Change Effective: All (WS133B)</p>	DEVIATION	W.G. FREDERICK	EW 30029	R.L. LAVERGNE	H.M. Geller	W.H. Frederick 5/17/63	4-30-63	EX 5-15-63	MM 5/15/63
THE BOEING COMPANY SEATTLE 24, WASHINGTON		MODEL WS-133B	NO. D10-20403		PAGE REV m					

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R

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FIGURE INDEX

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		E.B.D.	2-22-63	L	
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REV  
SYM M

For Approvals and Clearances, see D2-4858.

Final approval is granted to these units. The vendor is United ElectroDynamics Incorporated, Pasadena, California; Vendor code number 0A011.

	10-20403-13	▷			
	10-20403-12	▷			
	10-20403-11	▷			
	10-20403-10	▷			
	10-20403-9	▷ Vendor P/N 12966-3			
	10-20403-8	▷ Vendor P/N 12967-1			
	10-20403-7	▷ Vendor P/N 12966-2			
	10-20403-6	▷ Vendor P/N 12966-1			
	10-20403-5	▷ Vendor P/N 12967			
	10-20403-4	▷ Vendor P/N 12966-0			
	10-20403-3	▷ Vendor P/N 12819-3			
	10-20403-2	▷ Vendor P/N 12819-2			
	10-20403-1	▷ Vendor P/N 12819-1			
	10-20403-0	▷ Vendor P/N 12819			
REQD	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	MATERIAL	MATERIAL SPEC	WT
LIST OF MATERIAL					
Airborne FM/FM Telemetry System		CODE IDENT NO. <b>81205</b>	SIZE <b>A</b>	D10-20403	
		SCALE	AF 04(647)-289	SH	d



REV  
SYM M

For Approvals and Clearances, see D2-4858.

Final approval is granted to these units. The vendor is United ElectroDynamics Incorporated, Pasadena, California; Vendor code number 08011.

	10-20403-13	▷			
	10-20403-12	▷			
	10-20403-11	▷			
	10-20403-10	▷			
	10-20403-9	▷ Vendor P/N 12966-3			
	10-20403-8	▷ Vendor P/N 12967-1			
	10-20403-7	▷ Vendor P/N 12966-2			
	10-20403-6	▷ Vendor P/N 12966-1			
	10-20403-5	▷ Vendor P/N 12967			
	10-20403-4	▷ Vendor P/N 12966-0			
	10-20403-3	▷ Vendor P/N 12819-3			
	10-20403-2	▷ Vendor P/N 12819-2			
	10-20403-1	▷ Vendor P/N 12819-1			
	10-20403-0	▷ Vendor P/N 12819			
REQD	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	MATERIAL	MATERIAL SPEC	WT
LIST OF MATERIAL					
Airborne FM/FM Telemetry System		CODE IDENT NO <b>81205</b>	SIZE <b>A</b>	D10-20403	
		SCALE	AF 04(647)-289	SH	d

# SPECIFICATION DOCUMENT PAGE

## 1. SCOPE

### 1.1 SYSTEM FUNCTION

This specification outlines the characteristics and performance requirements of airborne FM/FM telemetry systems (10-20403, -1, -2, -3, -10 and -11) for use in research and development flight tests of an intercontinental ballistic missile.

### 1.2 SYSTEM COMPONENTS

The systems specified herein shall consist of the following major components as shown in block diagram, Figure 3. Systems 10-20403 and -1 are physically interchangeable. They differ electrically only in transmitter center frequency.

Systems -2 and -3 are electrically interchangeable with systems 10-20403 and -1 respectively. Physical differences are as noted on Specification Control Drawing, 10-20403.

Systems -10 and -11 are electrically and mechanically interchangeable with the -2 and -3 but are improved through incorporation of higher rated tubes and related circuit changes.

#### 1.2.1 Subcarrier Oscillators

The subcarrier oscillators shall convert the output signals from transducers and signal conditioners into frequency modulated IRIG subcarriers.

#### 1.2.2 Mixer

The mixer circuitry shall accept the modulated subcarrier oscillator output signals, mix these signals, and provide a single modulating input signal for the RF Section transmitter.

#### 1.2.3 RF Section

The RF Section shall consist of an RF transmitter unit and RF amplifier unit. The RF Section shall be suitable to accept the subcarrier mixer output voltage and produce a frequency modulated RF signal which will in turn be fed to an antenna triplexer. (Not part of this specification).

#### 1.2.4 D.C. Regulator

A D.C. regulator shall provide all power required for the subcarrier oscillator units.

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			R.L.L.	4-30-63	N	
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**1.2.5 High Voltage Power Supply**

The high voltage power supply shall furnish all the power required for the RF section.

**1.2.6 Component Mounting Structure**

Each complete system shall include two component mounting structures - One for the SCO section, Mixer circuitry and D.C. Regulator and the other for the R.F. section and High Voltage Power Supply. The component mounting structures shall provide all of the physical support required for these components, shall contain all inter-component electrical wiring, and shall provide heat sinks as required.

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# SPECIFICATION DOCUMENT PAGE

## 2. APPLICABLE DOCUMENTS

### 2.1 GOVERNMENT DOCUMENTS

The following government documents of the exact issue noted, together with the noted revisions thereto constitute a part of this specification, but only to the extent defined herein. In those cases where the document listed is not dated, the issue in effect on the date of invitation for bids, shall form a part of this specification. Where conflicting requirements exist, the requirements of this specification shall govern.

#### 2.1.1 Specification - Military

MIL-D-5028B "Drawing and Data Lists, Preparation of Manufacturers", dated 20 August 1956.

MIL-E-5400C "Electronic Equipment, Aircraft, General Specification for", dated 15 July 1958. B

MIL-D-5480C "Data, Engineering and Technical (Reproduction Thereof)", dated 29 September 1954. B

MIL-T-9107 "Test Reports, Preparation of", dated 13 July 1953.

MIL-E-005272B "Environmental Testing, Aeronautical and Associated Equipment, General Specification for", dated 5 June, 1957; with Notice 2 dated June 21, 1957.

MIL-F-14072 "Finishes for Ground Signal Equipment", dated 15 May 1955. B

#### 2.1.2 Standards

MIL-STD-12A Abbreviations for Use on Drawings" dated 11 March 1952.

MIL-STD-28 "Approved Method for Assignment of Drawing Titles", dated 2 June 1958.

MIL-STD-129B "Marking for Shipment and Storage" dated 10 April 1957 with Change Notice - 1 dated 6 January 1958.

MIL-STD-130A "Identification Marking of U.S. Military Property" dated 8 September 1958.

MIL-STD-1412 "Telemetry Standards for Missiles and Aircraft" dated 26 September 1958.

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2.1.3 Publications

ANA Bulletin 143d "Specification and Standards, Use of", dated 19 August 1954.

ANA Bulletin 405 "Storage Life - Aeronautical Article", dated September 21, 1951, including Amendment 3 dated July 20, 1956.

2.1.4 Deleted.

2.2 NON-GOVERNMENT DOCUMENTS

The following non-government documents, of the exact issues shown, form a part of this specification to the extent specified herein. In those cases where the document is not dated, the latest issue in effect on the date of invitation for bids shall form a part of this specification. One copy each of the documents listed below and marked with an asterisk is to be furnished with each copy of this specification being sent to a vendor. Where conflicting requirements exist, the requirements of the specification shall govern.

2.2.1 Publications

GM 07-59-2617A STL Document "Electro Interference Control Requirements for Minuteman (WS-133A)."

\*D2-3971 Boeing Document "Work Statement for Airborne FM/FM Telemetry Systems."

\*D2-4051 Boeing Document "Protective Finish Performance Document for Model WS-133A."

\*D5-2288 Boeing Document "Approved Standard Electronic Components."

\*D5-2300 Boeing Document "Packaging Requirements."

D2-4862 Boeing Document "Functional Test Procedures, 10-20403 Airborne FM/FM Telemetry System."

2.2.2 Drawings

\*10-20403 Boeing Drawing, Specification for Airborne FM/FM Telemetry Systems.

2.2.3 Correspondence

Boeing Materiel Letter to United ElectroDynamics 2-4446-8-216 dated July 30, 1959. (Confidential)

Boeing letter 2-6432-10-41, Nov. 17, 1961, RFI waiver request for the PCM/FM and FM/FM RF sections

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2.2.3 (Cont.) Correspondence

Boeing Materiel TWX to United ElectroDynamics  
2-4437-1-6229, dated 10-5-62.

Boeing memos 2-6425-01-78 and -82 dated 10-16-62;  
10-20403-7, -8, -9 Workmanship Deviations.

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3. REQUIREMENTS

3.1 DESIGN REQUIREMENTS FOR 10-20403, and -2. -10

The requirements set forth herein describe an airborne FM/FM telemetry system.

3.1.1 General Requirements

3.1.1.1 Physical Requirements

3.1.1.1.1 Selection of Specification and Standards - Specifications and standards for necessary commodities and services not specified herein shall be selected in accordance with ANA Bulletin 143, except as provided in paragraphs 3.1.1.1.1.1 and 3.1.1.1.1.2. The requirements of MIL-STD-442 apply to the extent specified herein as requirements of this specification.

3.1.1.1.1.1 Commercial Parts - Commercial parts having suitable properties may be used where, on the date of invitation for bids, there are no suitable standard parts. In any case, commercial utility parts like screws, bolts, nuts, cotter pins, etc. having suitable properties may be used provided:

- (a) They can be replaced by the standard parts (MS or AN) without alteration.
- (b) The corresponding standard part numbers are referenced in the parts list and, on the vendor's drawings.

3.1.1.1.1.2 Standard Parts - With the exception in paragraph 3.1.1.1.1.1, MS and AN standard parts shall be used where they suit the purpose. They shall be identified on the drawings by their part numbers.

3.1.1.1.2 Materials and Processes - All materials and processes used shall be in accordance with government material and process specifications wherever applicable. Where the vendor finds it necessary or desirable to use materials or processes not covered by government specifications, they shall be entirely suitable for the purpose. The use of lightweight materials, weight and space saving designs is a major consideration and their use shall be investigated and exploited to the greatest possible extent.

3.1.1.1.2.1 Deleted

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- 3.1.1.1.2.2      **Fungus-Proof Materials** - Materials that are nutrients for fungi shall not be used where it is practical to avoid them. Where used, they shall be treated with a fungicidal agent acceptable to BAC.
- 3.1.1.1.2.3      **Finishes** - Surfaces shall meet the applicable finish requirements specified in D2-4051. B
- 3.1.1.1.2.4      **Similar and Dissimilar Metals** - Similar and dissimilar metals shall be grouped in accordance with MIL-F-14072. The usage of dissimilar metals shall be in accordance with MIL-E-5400C. B
- 3.1.1.1.3      **Producibility** - The design shall allow the use of such methods and processes as will result in maximum production with a minimum expenditure of manhours and materials, commensurate with the quality requirements unique to the individual model or type.
- 3.1.1.1.4      **Maintainability** - Maintainability shall be considered as a design factor along with other major design parameters. The design shall provide for simple and rapid installation or removal of components (listed in section 1.2) from the component mounting structure, Boeing Drawing 10-20403, without disturbing or damaging interconnecting wiring and connectors, and without special tools or equipment. If a box type structure is utilized, the cover shall be removed without special tools and with a maximum of 10 bolts or screws. Any gaskets utilized with the cover shall be secured to the cover to prevent loss of, or damage to, the gasket upon removal of the cover. B
- 3.1.1.1.5      **Workmanship** - The equipment shall be fabricated and finished in a thoroughly workmanlike manner. Particular attention shall be given to freedom from defects of solder joints, connectors, conductors, insulation and printed circuits; proper wiring supports, circuit arrangement and conductor spacing; and cleanliness during and after assembly. Attention shall also be given to freedom from blemishes, defects, burrs, and sharp edges, accuracy of dimensions; radii of fillets and working of parts. BAC Document D5-2300 is applicable as noted above. D
- 3.1.1.1.6      **Interchangeability** - Articles and/or components manufactured in accordance with this specification shall be functionally, physically, and structurally interchangeable. See paragraph 3.1.1.5.3 for part number changes for non-interchangeable articles. B

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3.1.1.1.7

Construction - The construction of the system shall be adequate to obtain the required performance and reliability under the conditions of this specification. Modular construction shall be used to the greatest extent possible, and each major component as listed in section 1.2, shall be a plug-in type unit. In addition, the subcarrier oscillator section shall include 5 individual plug-in type subcarrier oscillator units. The design shall be such that any of the subcarrier oscillator units can be removed and replaced in the subcarrier oscillator section while the section is installed on the mounting structure. The entire subcarrier oscillator section in turn shall be designed such that it can be removed from and replaced on the component mounting structure without affecting the other major components. The component mounting structure may be utilized to serve as a heat sink and/or function as an RF shield. The major components and sub-components shall be identified by individual part number as specified in paragraph 3.1.1.5.

3.1.1.1.8

Components - With the exception of the RF section, the system shall contain only solid state components. Vacuum tubes and moving parts except for factory set adjustments, are prohibited. In the RF section, solid state components in proven, conservatively designed circuits shall be used to the greatest possible extent. All parts shall be chosen to provide high reliability and consistent performance in system operation.

3.1.1.1.9

Test Points - Care must be taken in providing electrical test points to ensure that external loads (such as cable capacitance or inadvertent shorts) introduced by the testing activities does not cause damage to the system or components under test. Electrical test points available for use in system testing shall be sufficient to isolate a fault to a major component plug-in unit. Test points monitoring DC functions of the RF package shall appear at a receptacle mounted on the RF package. As shown on specification control drawing 10-20403, this receptacle shall be located on the same surface as the RF coax connector. Test points shall include but are not limited to the followings:

3.1.1.1.9.1

Each subcarrier oscillator shall have test points to monitor the output signal.

3.1.1.1.9.2

Summing network output shall be provided at test points.

3.1.1.1.9.3

Voltage regulator output shall be made available at test points.

3.1.1.1.9.4

High voltage power supply output shall be made available at test points.

3.1.1.1.10

Physical Size - Envelope limits and installation mounting facilities for the system shall be in accordance with the Boeing Specification Control Drawing 10-20403.

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- 3.1.1.1.11 Weight - The weight of the system components shall be the minimum consistent with the requirements of the specification and within the limitations of sound design practices. It shall not exceed the value specified on the Boeing Specification Control Drawing 10-20403.
- 3.1.1.2 Electrical Requirements
- 3.1.1.2.1 Electrical Interference Suppression - The system shall meet the requirements of STL Document GM 07-59-2617A. The systems are defined as Class I per GM 07-59-2617A. H
- 3.1.1.2.2 Dielectric Strength - The system shall be capable of withstanding the non-operative environmental conditions of section 3.1.1.3.1, and shall be capable of operation under the operative environmental conditions of section 3.1.1.3.2, without failure or malfunction.
- 3.1.1.2.3 Electrical Connectors - Connectors into the telemetry package from power source, transducers and antenna shall be located as shown, and shall be of the type specified, on BAC Drawing 10-20403. Connectors on the plug-in components except the power supply and RF power amplifier shall be Cannon type DAD or DED. The power supply and RF power amplifier power connectors shall be Cannon DE or DA type within a pressure sealed cavity using a vulcanized compression gasket seal at the interfaces. RF connectors utilized within the assembly shall be type TNC or TM.

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3.1.1.2.4 Internal Wiring - Internal wiring shall consist of printed circuits and shall be securely fastened to the mounting structure. Any electrical wire used shall be in accordance with an appropriate military specification and shall be insulated with cold flow resistant dielectric.

3.1.1.2.5 Electric Parts List - The Vendor must submit to BAC for approval a complete list of the type and manufacturer of all electronic parts. BAC Document D5-2288 is applicable whenever design permits.

3.1.1.2.6 Grounding - The provisions of GM 07-59-2617A, paragraph 3.2.9, are applicable. Single point grounding external to the equipment package will be employed for all circuits except those of the RF section; thus, circuits within the equipment package shall be isolated from equipment cases and base as described below:

- (a) Transmitter-RF Amplifier: A minimum DC isolation of one megohm shall exist between the RF chassis ground and all signal input leads. DC isolation shall be provided by a transformer external to the transmitter.
- (b) High Voltage Power Supply: A minimum isolation of one megohm shall exist between (1) input terminals (leads) and case ground, (2) output terminals and case ground, and (3) input terminals and output terminals.
- (c) Sub-Carrier Oscillators: A minimum isolation of one megohm from 0 to 500 cps between case ground and any point on the signal circuit shall be provided. A minimum DC isolation of one megohm shall exist between input power terminals (leads) and case ground. Separate signal and power ground leads shall be provided, through connector pins. Isolation between signal circuit and power circuit within the unit is not a requirement.
- (d) Regulator: A minimum DC isolation of one megohm shall exist between case ground and all input and output terminals (leads).
- (e) All Units: To prevent the formation of "power loops" (low resistance loops formed by power distribution leads and signal return leads), balanced circuit design shall be utilized.

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3.1.1.2.7 Bonding - The provisions of GM 07-59-2617A, paragraph 3.2.3 apply. Electrical bonding shall be provided between all component cases and component mounting structure. A direct metal to metal contact with the two surfaces held together by positive pressure is preferred. Except for the RF Section, bonding may be accomplished through one of the component connector pins. A bonding strap shall be used on the RF section in lieu of metal to metal contact.

3.1.1.3 Environmental Conditions

3.1.1.3.1 Non-Operative Conditions - The FM/FM telemetry system shall be capable of satisfying the performance requirements of section 3.1.2.1.2 after being subjected to the following environmental conditions.

3.1.1.3.1.1 Temperature-Altitude - An ambient pressure-altitude range of sea level to 50,000 feet as encountered during air transport and air temperatures ranging from a minimum of -80°F (-62°C) to a maximum of plus 160°F (71°C), under unsheltered ground conditions. (This figure is based on a free air temperature of 125°F increased by 35°F solar radiative heating of a packing case or enclosure.) The air temperature may change at rates up to 1.8°F (1.0°C) per second.

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- 3.1.1.3.1.2 Vibration - Complex vibration (including sinusoids and random noise) of which the combined maximum is represented by the sinusoidal vibration envelope of Figure 4.
- 3.1.1.3.1.3 Humidity - Relative humidity to 100% with conditions such that condensation takes place in the form of water or frost.
- 3.1.1.3.1.4 Shock - Shocks involved in free drops of up to 1 inch and pivot drops up to 4 inches as encountered in shipment. Corresponding acceleration peaks may be 100g.
- 3.1.1.3.1.5 Sand and Dust - Exposure to sand and dust as encountered in desert areas.
- 3.1.1.3.1.6 Salt Spray - Exposure to salt spray atmosphere as encountered in sea coast areas.
- 3.1.1.3.1.7 Fungus - Fungus growth as encountered in tropical climates.
- 3.1.1.3.2 Operative Conditions - The FM/FM telemetry system shall be capable of satisfying the performance requirements of section 3.1.2.1.2 while being subjected to the following environmental conditions:
- 3.1.1.3.2.1 Temperature-Altitude - An ambient pressure-altitude change from sea level to 200,000 feet altitude within 1.5 minutes followed by a constant pressure-altitude of 200,000 feet for 3 minutes. There will be provisions for ground cooling to an ambient compartment temperature of + 65°F during the pre-launch period. Within one minute after missile launch, the equipment will be subjected to 700°F thermal radiation from external compartment walls. The duration of the 700°F thermal radiation will be about 3 minutes.
- 3.1.1.3.2.2 Vibration - Complex vibration including sinusoids as represented by the vibration envelope of Figure 5 and random noise as represented by the vibration envelope of Figure 6.
- 3.1.1.3.2.3 Humidity - Relative humidity to 100%.
- 3.1.1.3.2.4 Shock - Shocks caused by missile engine ignition and cutoff. Excitation of equipment due to shock is considered covered in paragraph 3.1.1.3.2.2.
- 3.1.1.3.2.5 Acceleration - Sustained acceleration of 15g maximum in each of 3 mutually perpendicular axes.

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3.1.1.3.2.6 Acoustical Field - Sound pressure levels of 140 db (RE 0.0002 d/cm<sup>2</sup>) principally below 300 cps. B

3.1.1.3.2.7 Angular Oscillation - Maximum and rms excursions as follows about each of three mutually perpendicular axes.

<u>Frequency Range</u>	<u>Maximum Excursion</u>	<u>RMS Excursion</u>
0.5 to 1 cps	1 degree	0.3 degree
1 to 3 cps	0.5 degree	0.15 degree
3 to 12 cps	0.1 degree	0.03 degree
above 12 cps	Determined by local mounting conditions.	

3.1.1.4 Reliability

Reliability shall be considered as a design factor on an equal basis with other design criteria such as performance, weight, and cost. The reliability of the article shall be such that when integrated into the system of which it is a part, it will perform its design function throughout its required life.

3.1.1.4.1 Reliability Requirement - The reliability of each telemetry system is defined as the probability of successful operation for 30 minutes at ground environmental conditions and successful operation for 4.0 minutes while subjected to flight environmental conditions. A reliability of 0.990 is required for the telemetry system. B

3.1.1.5 Identification of Product

The information specified shall be permanently marked on the article, using materials and/or processes that will insure legibility during the expected life of the article and the preproduction tests of section 4.0. Identification marking of the article shall conform to MIL-STD-130A, except that spaces for marking stock number, registration number, date of manufacture, contractor order number, and weight may be left blank. The vendor's part number shall completely identify the article in the last 12 or less digits. In accordance with MIL-STD-130A, the following major components and sub-components, shall be identified by individual part numbers: RF Amplifier, each RF Transmitter of a particular frequency, High Voltage Power Supply, Voltage Regulator, each subcarrier oscillator of a particular frequency and the two component mounting structures. B

3.1.1.5.1 Boeing Part Number - The Boeing specification control part number shall not be permanently marked on the article here shall it be contained in any part of the vendors part number.

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3.1.1.5.1  
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To facilitate BAC handling, a separate and easily removable tag or adhesive label bearing the BAC part number shown on the specification control drawing shall be affixed to the article. A tag shall not be attached through a mounting hole.

3.1.1.5.2

Serial Numbering - Articles manufactured in accordance with this specification shall bear serial numbers assigned by the vendor. The serial numbering system is the option of the vendor.

3.1.1.5.3

Part Number Changes - Articles which completely satisfy the requirements of this specification shall be assigned a specific vendor part number. Articles which do not completely satisfy the requirements of this specification shall be differentiated from those that do, by a different vendor part number. In addition, different Boeing dash numbers may be assigned to distinguish parts not completely satisfying the requirements of this specification. After final approval of the article by BAC, the part number assigned by the vendor shall be positive identification such that the article may be procured by vendor part number alone without reference to this specification. Changes in the article, whether initiated by BAC or the vendor, which affect functional, physical, or structural interchangeability shall always be attended by a change in vendor's part number to identify the new configuration. The drawing number requirements of MIL-D-5028B shall govern changes in the manufacturer's part number.

3.1.2

## Detailed Requirements

3.1.2.1

### System Requirements

3.1.2.1.1

Design Requirements - The design of the airborne FM/FM telemetry system shall be adequate to obtain the required performance stated in section 3.1.2.1.2 and the reliability requirements as stated in paragraph 3.1.1.4.1, and shall take into consideration possible degradation of performance due to production variations, environmental conditions and aging.

3.1.2.1.1.1

Component Interdependence - As a design objective, the design of the various units shall be such that failures will be contained in the faulty unit and will not cause damage in other units or prevent operation of un-related units, i.e. loss of a power supply should not damage the transmitter, or failure of an SDO should not affect operation of the other SDO's.

3.1.2.1.1.2

System Input Signals - The individual channel input voltages and input impedances are listed in Table I of this specification.

3.1.2.1.1.3

Power Source - The telemetry system shall operate from a  $28 \pm 2$  volt DC power system including a maximum ripple of 1.0 volt peak-to-peak. The maximum current shall not exceed 4.25 amperes under all operating conditions except for 2:1 and 5:1 VSWR load conditions where a maximum current of 4.5 amperes is allowable.

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- 3.1.2.1.1.4      **Adjustments** - The system shall operate within the tolerances specified herein during the entire operational life of the equipment while being subjected to the environmental conditions specified without adjustment or tuning. Any adjustment controls utilized by the vendor shall be positively locked and sealed prior to delivery. Such adjustments with the exception of the RF tuning control, shall not be accessible without disassembly of the plug-in components. The RF tuning control shall be accessible for adjustment after assembly of the unit; however, the control must be positively sealed prior to delivery. Signal inputs and input voltage controls such as switches or relays shall not be utilized. C
- 3.1.2.1.1.5      **Transient Potentials** - The design shall be such that the equipment will not be damaged when subjected to transient potentials of  $28 \pm 12$  volts for a maximum duration of 25 milliseconds at a repetition rate not greater than one pulse per hour. E
- 3.1.2.1.1.6      **Overvoltage and Undervoltage Protection** - The ground power supply will be automatically shut down within 50 milliseconds should the voltage exceed the limits of 40 and 16 volts. Protection of the telemetry equipment from high voltages exceeding 40 volts during the 50 millisecond period should be considered as a design objective. E

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## 3.1.2.1.2 Performance Requirements

- 3.1.2.1.2.1 The integrated system shall be operated to provide assurance that the detailed performance requirements of the major components are satisfied.
- 3.1.2.1.2.2 The integrated system operation shall be performed on the bench under controlled conditions with calibrated receiver, recorder and necessary test equipment.
- 3.1.2.1.2.3 The system shall be subjected to applicable voltages and frequencies which shall be recorded for comparison of input and output transmission accuracies.
- 3.1.2.1.2.4 The performance results obtained as per paragraph 3.1.2.1.2.3 shall be used as a standard for comparison purposes with system performance while being subjected to flight proof and acceptance testing.
- 3.1.2.1.2.5 The integrated system performance procedure and results shall require EAC approval before acceptance as a standard.
- 3.1.2.1.2.6 Life - The system total operating life shall be 500 hours. Mainly, this life will be accumulated on the bench in normal ambient environment and as installed in the missile in the launching revetment. The system will operate at all times during the missile's flight life and will be used to obtain data from a time several minutes prior to first missile motion until flight termination.
- 3.1.2.1.2.7 Cooling - The system may be operated for an indefinite period on the bench at an ambient temperature of 80°F without external cooling. During the pre-launch period, there will be ground-cooling provisions which will maintain the telemetry system ambient temperature at approximately 65°F. These ground cooling provisions will be available until 10 seconds before launch. During flight, there shall be no external cooling system or equipment for the telemetry systems described by this specification. The telemetry systems shall therefore be designed and protected as necessary to perform within the limits specified in the following paragraphs while being subjected to the temperature-altitude environmental conditions as described in paragraph 3.1.1.3.2.1.

## 3.1.2.2 Subcarrier Oscillator Requirements

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3.1.2.2.1 Design Requirements - The subcarrier oscillator center frequencies and bandwidths shall be per IRIG standards as defined by MIL-STD-442. The specific SCO center frequencies are listed in Table 1.

3.1.2.2.1.1 Abbreviations - The following abbreviations are used in this document to describe subcarrier oscillator requirements.

- $F_0$  = IRIG center frequency
- $F_1$  = IRIG upper band edge
- $F_2$  = IRIG lower band edge
- $F_1 - F_2$  = IRIG bandwidth
- $f_0$  = Subcarrier Oscillator Center Frequency
- $f_1$  = Subcarrier frequency with + 5.0 volts DC  $\pm$  0.1% ( $\pm$  0.0050 volts DC) applied to the modulator input.
- $f_2$  = Subcarrier frequency with zero volts DC  $\pm$  0.0050 volts DC applied to the modulator input.
- $f_2 - f_1$  = Intelligence Subcarrier Bandwidth

3.1.2.2.1.2 Deleted.

3.1.2.2.1.3 Frequency modulation of the subcarrier sine wave output shall be proportional to the input signal amplitude with decreasing frequency caused by an increasing positive signal.

3.1.2.2.2 Performance Requirements - With power being supplied to the system in accordance with section 3.1.2.1.1.3 and the input signals in accordance with paragraph 3.1.2.1.1.2, and SCO's shall satisfy the following performance requirements:

3.1.2.2.2.1 The SCO's shall each include an output filter which provides a minimum of 20 db attenuation at adjacent band edges. Voltage limiters as required shall be included to protect the SCO's from damage when up to 8 times the rated positive input voltage is applied.

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- 3.1.2.2.2.2 Deleted
- 3.1.2.2.2.3 Modulation Sensitivity - A 0 or +5 volt signal into each SCO shall modulate the SCO at least 90% but not more than 92% of IRIG full scale deviation.
- 3.1.2.2.2.4 Frequency Response - The frequency response of each SCO shall be flat within  $\pm 2.5\%$  (0.25 db) for a modulation index of 5 or greater.
- 3.1.2.2.2.5 Deviation Linearity - The deviation linearity of each SCO shall be within 1% (of bandwidth) of the best straight line (least squared method).
- 3.1.2.2.2.6 Stability - The stability of each SCO shall be such that with the modulation sensitivity as specified in paragraph 3.1.2.2.2.3, the operating environment in accordance with section 3.1.1.3.2 and the voltage never exceeding 0 to + 5 volts, it shall be impossible to deviate the SCO outside the IRIG bandwidth during the system operating life. Zero drift versus temperature shall be less than  $\pm 2\%$  of bandwidth and sensitivity change versus temperature shall be less than  $\pm 1\%$  of bandwidth (32°F to 150°F)
- 3.1.2.2.2.7 When any SCO is deviated from  $f_2$  to  $f_1$  by a corresponding input voltage (at any frequency from zero to the highest allowable input frequency for that SCO nominal frequency), the output voltage of the SCO over the band of  $f_2 - f_1$  shall not vary by more than a total of 25%.
- 3.1.2.2.2.8 Variations of system input voltage from 26 to 30 volts shall not produce an output frequency change exceeding  $\pm 1\%$  of  $F_1 - F_2$ .
- 3.1.2.2.2.9 The distortion products that lie within the frequency band of any other SCO intelligence band shall be less than 1% of the rated output of the SCO in that band. The input of both subcarrier oscillators shall be grounded only when this test is performed.

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3.1.2.2.2.10 Each SCO shall meet linearity and frequency stability requirements over a range of source impedance from 0 to 10,000 ohms.

3.1.2.2.2.11 Feed Through - The input information signal frequency components appearing at the output of the SCO shall be at least 40 db below the sub-carrier oscillator output signal.

3.1.2.3 Mixer Requirements

The mixer circuitry shall contain passive elements only, and shall perform its function by means of a simple resistor network. The network shall feature a common mixing resistor being fed by the subcarrier oscillator signals thru a series of resistors.

3.1.2.4 D.C. Regulator Requirements

3.1.2.4.1 Design Requirements -

3.1.2.4.1.1 Primary Power - Primary power available for the DC regulator unit will be as specified in paragraph 3.1.2.1.1.3.

3.1.2.4.1.2 Feedback Ripple - The regulator unit shall contain adequate filtering at its input terminals to eliminate any feedback ripple greater than 1.00% to the primary power source.

3.1.2.4.2 Performance Requirements - With power supplied in accordance with paragraph 3.1.2.1.1.3 the dc regulator shall supply the necessary voltages with proper regulation for satisfactory performance of the low voltage circuits. Should a short circuit occur across the power terminals within an SCO, the effects of the short circuit shall not be reflected at the output terminals feeding the other SCO's. The use of fuses or circuit breakers to provide this protection is prohibited.

3.1.2.5 High Voltage Power Supply Requirements

3.1.2.5.1 Design Requirements -

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3.1.2.5.1.1	Primary Power - Primary power available for this unit will be as specified in paragraph 3.1.2.1.1.3.				
3.1.2.5.1.2	Feedback Ripple - The unit shall contain adequate filtering at its input terminals to eliminate any feedback ripple greater than 1.00% to the primary power source. The primary power source impedance, including cabling to the unit shall be a minimum of 1.1 ohms.				
3.1.2.5.2	Performance Requirements - With power supplied in accordance with paragraph 3.1.2.1.1.3 the high voltage power supply shall supply all power necessary for satisfactory performance of the RF Section. The high voltage power supply shall provide protection against the effects of accidental output shorts without the use of fuses or circuit breakers.				
3.1.2.6	RF Section Requirements				
3.1.2.6.1	Design Requirements - The RF Section transmitter shall be crystal stabilized.				
3.1.2.6.1.1	Deleted.				C
3.1.2.6.1.2	Center Frequency - The center frequency of the RF section shall be in the 225 to 260 megacycles band.				
3.1.2.6.1.3	Modulation - Modulation shall be true FM and shall be linear to 1% of the best straight line (least squares method) over the transmitter deviation.				
3.1.2.6.2	Performance Requirements - With power supplied to the system in accordance with section 3.1.2.5.2 and the input signals in accordance with paragraph 3.1.2.6.2.8, the RF section shall satisfy the following performance requirements:				
3.1.2.6.2.1	VSWR - Over the frequency range specified in paragraph 3.1.2.6.1.2, the RF section shall work into a load whose impedance lies on or within a VSWR circle of 2.0 on a Smith Chart normalized to 50 ohms.				C
3.1.2.6.2.2	Power Output - The power output of the RF section shall be a minimum of 13 watts, and shall not exceed 17 watts.				C
3.1.2.6.2.3	Linearity - The power output shall be constant within $\pm 0.5$ db over the maximum transmitter deviation.				
3.1.2.6.2.4	Spurious Radiation - With the exception of the allocated missile receiver passbands, all spurious antenna conducted signals shall be at least 60 db down from the carrier level. Spurious antenna conducted signals in the allocated receiver passbands shall be at least 102 db down from the carrier level; the receiver passbands are as follows: 405-420 mc; 4.9 - 5.1 Kmc.				C
3.1.2.6.2.5	Distortion- The RF section shall not distort the subcarrier oscillator voltages by more than 1%. This means that not more				
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## 3.1.2.6.2.5 (Cont'd)

than 1% additional noise shall be measured relative to the amplitude of the output voltage of the SCO that normally occupies that band. This measurement must be made with all SCO's operating and inputs grounded.

## 3.1.2.6.2.6

Stability - The carrier frequency shall be stable to within  $\pm 0.01\%$  (including the center frequency tolerance of paragraph 3.1.2.6.2.7) under all environmental operating conditions.

## 3.1.2.6.2.7

Center Frequency - The center frequency shall be within  $\pm 0.005\%$  of the frequency specified. The center frequency is designated in BAC letter to United Electrodynamics, Inc., reference 2-4446-8-216 dated July 30, 1959. (The center frequency is defined to be the frequency of the crystal excited oscillator section of the transmitter).

## 3.1.2.6.2.8

Transmitter Deviation - The output voltage of each subcarrier oscillator at band center after mixing shall be as required to deviate the transmitter within the following limits:

### SCO

10.5 kc	$\pm 4 \pm 1$ kc
14.5 kc	$\pm 6 \pm 1$ kc
22 kc	$\pm 11 \pm 1$ kc
40 kc	$\pm 27 \pm 3$ kc
70 kc	$\pm 64 \pm 7$ kc
	$\pm 112 \pm 13$ kc

## 3.1.2.6.2.9

No more than 10% peak to peak amplitude modulation of any sub-carrier voltage may be caused by the RF section, in addition to amplitude modulation due to the SCO itself. This shall be measured by observing the subcarrier signal at the output of an FM receiver (Nems-Clarke 1401-A or equivalent) when the RF section is modulated by a single SCO whose output voltage is adjusted in accordance with paragraph 3.1.2.6.2.8 and whose frequency is deviated between  $F_1$  and  $F_2$ . Amplitude modulation caused in the receiver may be deducted.

## 3.1.2.6.2.10

Loss of Excitation shall not result in power amplifier tube failure.

## 3.1.2.6.2.11

The RF Section shall meet the requirements of section 3.1.2.6 during system input voltage variations between 26 to 30 volts dc.

## 3.2

DESIGN REQUIREMENTS FOR 10-20403-1, and -3.

The requirements set forth herein describe an airborne FM/FM telemetry system.

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3.2.1

All design requirements for FM/FM telemetry system 10-20403 as specified in section 3.1 are applicable, with the exception of the transmitter center frequency which is specified in Boeing letter to United Electrodynamics reference 2-4446-8-216 dated July 30, 1959. (Confidential)

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**3.3. DESIGN REQUIREMENTS FOR 10-20403-10**

The requirements set forth herein describe an airborne FM/FM telemetry system.

**3.3.1 General Requirements**

**3.3.1.1 Physical Requirements**

The physical requirements for this system are the same as stated in section 3.1.1.1 except for paragraphs 3.1.1.1.6 and 3.1.1.1.9.4.

**3.3.1.1.1 Interchangeability** - Articles and/or components manufactured in accordance with this specification shall be functionally, physically and structurally interchangeable. See paragraph 3.3.1.5.1 for part number changes for non-interchangeable articles.

**3.3.1.2 Electrical Requirements**

The electrical requirements for this system shall be the same as stated in section 3.1.1.2.

**3.3.1.3 Environmental Conditions**

The environmental conditions are to conform to the requirements of section 3.1.1.3 except for paragraph 3.1.1.3.2.2.

**3.3.1.3.1 Vibration** - Complex vibration including sinusoids as represented by the vibration envelope of Figure 5 and random noise as represented by the vibration envelope of Figure 6 shall apply to 10-20403-8 SCO package.

**3.3.1.3.2 Vibration** - The random noise vibration envelope of Figure 11 and the sinusoidal vibration envelope of Figure 12 shall apply to the RF Section 10-20403-12.

**3.3.1.4 Reliability**

The reliability requirements of section 3.1.1.4 shall apply.

**3.3.1.5 Identification of Product**

The identification of product requirements of section 3.1.1.5 shall apply except for paragraph 3.1.1.5.3.

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## 3.3.1.5.1

Part Number Changes - Articles which completely satisfy the requirements of this specification shall be assigned a specific vendor part number. Articles which do not completely satisfy the requirements of this specification shall be differentiated from those that do, by a different vendor part number. In addition, different Boeing dash numbers may be assigned to distinguish parts not completely satisfying the requirements of this specification. After final approval of the article by The Boeing Company, the part number assigned by the vendor shall be positive identification such that the article may be procured by vendor part number alone without reference to this specification. Changes in the article, whether initiated by The Boeing Company or the vendor, which affect functional, physical, or structural interchangeability shall always be attended by a change in vendor's part number to identify the new configuration. New drawings, requiring new drawing numbers, shall be drawn in accordance with MIL-D-70327.

## 3.3.2

Detailed Requirements

All of the Detailed Requirements of section 3.1.2 shall apply.

## 3.4

## DESIGN REQUIREMENTS FOR 10-20403-11

The requirements set forth herein describe an airborne FM/FM telemetry system.

## 3.4.1

All design requirements for FM/FM telemetry system 10-20403-10, as specified in section 3.3 are applicable, with the exception of the transmitter center frequency which is specified in Boeing letter to United ElectroDynamics reference 2-4446-8-216, dated July 30, 1959.

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## 4.0 QUALITY ASSURANCE PROVISIONS

### 4.1 CLASSIFICATION OF TESTS

The inspection and testing of the equipment procured under this specification shall be classified as indicated in paragraphs 4.1.1, 4.1.2, and 4.1.3.

#### 4.1.1 ACCEPTANCE (VENDOR FUNCTIONAL) TESTS

Acceptance tests are those tests which shall be accomplished by the Vendor on equipment submitted for acceptance under contract. Acceptance testing is generally divided between "Individual Tests" and "Sampling Tests". "Component Tests" may also be included as a type of an Acceptance Test.

4.1.1.1 SEVERITY OF TESTS - Acceptance tests shall not have detrimental effects on the operational life of the equipment but shall assure that each production article is the equal of that which successfully passed the pre-production tests.

4.1.1.2 TEST PROCEDURE - The Vendor shall provide the Buyer with a detailed description, in document form, of the proposed acceptance test procedure and equipment sufficiently early for BAC comment and approval prior to the scheduled start of acceptance testing. The approval of the procedure and equipment by BAC does not relieve the Vendor of the responsibility to assure that the tests adequately prove compliance with the specification requirements. Changes to the procedure may be made only after BAC approval.

4.1.1.3 RECORDS - Adequate inspection and test records of all acceptance testing shall be kept by the Vendor so that failure and reliability studies may be conducted utilizing these records as a reference. A reproducible form as shown in Figure 2 and, supplied by the Buyer or the Vendor using the BAC format, shall be completed for each article tested. The reproducible shall be submitted to the Buyer and a copy included with each article tested.

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4.1.2

## Preproduction (Flight Proof) Tests

Flight proofing tests are intended to evaluate reliability and performance accuracy of developmental equipment prior to flight testing of similar equipment.

4.1.2.1

### Test Procedure

The Vendor shall provide the Buyer with a description of the proposed test procedure and equipment sufficiently early for BAC comment and approval prior to the scheduled start of flight proof testing. The approval of the procedure and equipment by BAC does not relieve the Vendor of the responsibility to assure that the tests, when performed, adequately prove compliance with all requirements of the specification.

4.1.2.2

### Changes Necessary to Complete Tests

All changes made necessary by the failure of a unit to pass the complete flight proof test shall be incorporated at the Vendor's place of business on all future units shipped to BAC.

4.1.2.3

### Proof Required of Tests

The Vendor shall test the unit in such a manner as to conclusively prove to the extent specified under paragraph 4.5 that the requirements of the applicable paragraph of Section 3.0 have been met.

4.1.2.4

### Records

Adequate records of all flight proof testing shall be kept by the Vendor to support failure and reliability studies and results presented in the test reports of paragraph 6.4.4.2.

4.1.2.5

### Discrepancies

The required procedures when discrepancies occur during testing are described in paragraph 6.4.5.

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4.1.3

## BAC Receiving Inspection and Functional Tests

Receiving inspection and functional tests are performed by the Buyer to insure that articles are satisfactory before their incorporation in an end product.

### NOTE:

The BAC inspection and functional test requirements included in this specification are primarily intended for the use of BAC personnel. Although they may be useful to the Vendor as a guide, they shall not be considered as establishing the quality limits on design requirements of the article.

4.2

## TEST CONDITIONS

4.2.1

### Atmospheric Conditions

Unless otherwise specified, all tests required by this specification shall be made at an atmospheric pressure of 28 to 32 inches of mercury, a temperature of 75°F plus or minus 10°F, and a relative humidity of 80% or less. Where tests are made with atmospheric pressure or temperature substantially different from the above values, proper allowance shall be made for any change in instrument readings.

4.3

## ACCEPTANCE TEST REQUIREMENTS AND PROCEDURES

### NOTE:

Reference should be made to paragraph 4.1.1 for general description of acceptance tests.

4.3.1

### Individual Tests for 10-20403, -11, -12, -13, and -14 and -11

The following tests shall be performed by the vendor on each system shipped and shall be applied to each system as whole.

4.3.1.1

#### Examination of Product

The system shall be examined for satisfactory compliance with the weight, dimensional, nameplate, finish and workmanship requirements.

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4.3.1.2

## Performance

The equipment shall be operated for at least ten operating cycles, under room conditions and self imposed environment. An operating cycle shall consist of activating and varying each information channel through its complete operating range. The equipment shall operate without failure or malfunction throughout this test. The test shall include at least three start-ups.

4.3.1.3

## Vibration

With the system operating in accordance with section 3.1.2.1.2 the system shall be vibrated in accordance with Figure 7 in each of three coordinate directions. The duration of vibration shall be one sweep at 1 octave/minute (approximately 8 minutes in each direction). The vibration shall be applied and measured at the attachment points of the equipment to structure. The system shall perform without failure or malfunction. Upon completion of the above vibration tests, the system shall be subjected to one cycle of operation as described in paragraph 4.3.1.2, and the system operation within the performance limits defined, shall be verified.

4.3.2

## Sampling Tests for 10-20403, -1, -2, -3, -10 and -11

Not applicable.

4.4

## COMPONENT TESTS

4.4.1

### Component Testing for 10-20403, -2 and -10

Not applicable.

4.4.2

### Component Testing for 10-20403-1, -3, and -11

Not applicable.

4.5

## PREPRODUCTION TEST REQUIREMENTS AND PROCEDURES

### NOTE:

Reference should be made to paragraph 4.1.2 for general description of preproduction tests.

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## 4.5.1

### Preproduction (Flight Proof) Tests for 10-20403

The following tests shall be applied to the system as a whole and with the exception of the tests described by paragraph 4.5.1.7, are applicable to one set of equipment. The environmental tests may be performed in any manner except that the mechanical tests (vibration, acceleration and shock) shall precede the climatic tests (temperature, altitude and humidity).

## 4.5.1.1

### Examination of Product

The procedures of paragraph 4.3.1.1 are applicable.

## 4.5.1.2

### Vibration

While operating in accordance with section 3.1.2.1.2, the system shall be vibrated in each of three coordinate axes in accordance with the vibration envelopes of Figures 5 and 6. The sinusoidal and random vibrations shall be applied simultaneously and measured at the points of mounting of the equipment to structure. Duration of applied vibration shall be 15 minutes in each axis. During the above vibration, the equipment shall operate without failure or malfunction and within performance limits specified in section 3.1.2.1.2.

## 4.5.1.3

### Acceleration

While energized, the equipment shall be centrifuged for a minimum of 3 minutes in each direction along 3 mutually coordinate axes at an acceleration of 15g. The performance of section 3.1.2.1.2 shall be conducted as practicable. No failure, malfunction or performance outside the limits specified in section 3.1.2.1.2 shall occur. Upon completion of each centrifuge test, the equipment shall meet the performance limits specified in section 3.1.2.1.2.

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## 4.5.1.4

## Temperature-Altitude

With the equipment non-operative, the system shall be subjected to a test chamber pressure corresponding to an altitude of 50,000 feet simultaneously with a temperature of  $-80^{\circ}\text{F}$  for 8 hours. The chamber pressure shall then be restored to ambient, and the temperature raised to  $32^{\circ}\text{F}$  and maintained at  $32^{\circ}\text{F}$  until the temperature of the equipment stabilizes. While operating, the equipment shall then be thermally irradiated by an enclosure simulating compartment walls. The enclosure shall be as follows:

- (a) The walls and top of the test chamber shall have an emissivity of  $.25 \pm .05$ .
- (b) All sides of the test article shall be located no further than 2.5 inches from the corresponding radiating test chamber walls.
- (c) The article shall be either suspended or thermally insulated at the attachment points of the test chamber to prevent the article from utilizing the test chamber for a heat sink.
- (d) Provisions shall be made to heat four walls of the test chamber to  $700^{\circ}\text{F} \pm 50^{\circ}\text{F}$  within one minute from stabilized ambient and to maintain the  $700^{\circ}\text{F} \pm 50^{\circ}\text{F}$  wall temperature for three minutes.

## 4.5.1.4.1

During the first minute of this portion of the test, the pressure shall be reduced from sea level to 90,000 feet altitude. At the same time, the wall temperature of the enclosure shall be increased to  $700^{\circ}\text{F} \pm 50^{\circ}\text{F}$ . The 90,000 feet altitude and the  $700^{\circ}\text{F}$  wall temperature condition shall be maintained for three minutes. The equipment shall perform during and after the test with no failure, malfunction or out-of-tolerance performance degradation.

## 4.5.1.4.2

Altitude - While operating under a self-imposed ambient temperature, the system shall be subjected to a reduction in test chamber pressure from that of sea level to 200,000 feet. The reduction in pressure shall occur within 1.5 minutes and the 200,000 feet altitude condition shall be maintained for 2.5 minutes. The equipment shall perform with no failure, malfunction or out-of-tolerance performance degradation. B

## 4.5.1.5

## Humidity

While non-operative, the system shall be subjected to 100 cycles of temperature variation at a relative humidity of 95%. Each cycles shall consist of a test chamber temperature of  $120^{\circ}\text{F}$  ( $49^{\circ}\text{C}$ ) for one hour, followed by a test chamber temperature of  $110^{\circ}\text{F}$  ( $43^{\circ}\text{C}$ ) for one hour. Upon completion of the 100 cycles the chamber temperature shall then be lowered to  $80^{\circ}\text{F}$  ( $27^{\circ}\text{C}$ ) within one hour with the relative humidity maintained at 95%. The system shall then be operated, under these conditions in accordance with section 3.1.2.1.2. The system shall perform without failure or malfunction and within the limits specified in section 3.1.2.1.2.

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## 4.5.1.6 Interference

With the exception of paragraph 4.3.4.4 of STL Document GM 07-59-2617A, the procedures and tests of GM 07-59-2617A are applicable. The tests required by section 4.3.1 of GM 07-59-2617A are applicable to all power and signal leads (properly loaded).

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## 4.5.1.7

## Reliability Tests

The reliability test shall consist of operation of 10-20403 systems, while being subjected to simulated ground environment and simulated flight environment cycles. Each cycle shall consist of 30 minutes operation at sea level pressure and 65°F ambient temperature, followed immediately by four minutes of operation under simulated flight environment. Flight vibration conditions shall be simulated by simultaneous sinusoidal and random vibration, from 5 cycles to 2000 cycles at levels indicated by Figures 9 and 10. Sinusoidal sweep from 5 cycles to 2000 cycles shall be completed every fifth test cycle. Simulated flight environment shall be accomplished by vibrating the systems while simultaneously exposing the systems to temperature-altitude conditions. The temperature-altitude simulation shall be as follows: The systems shall be installed in an enclosure, simulating missile compartment walls, (internal surface emissivity = 0.25), with the outer surface of the units comprising the systems no more than 2.5 inches from one radiating surface of the enclosure. During the first minute of simulated flight conditions, the pressure shall be reduced from sea level to 90,000 feet altitude. At the same time the simulated compartment wall temperature shall be increased to 700°F. The 90,000 feet altitude and 700°F wall temperature conditions shall be maintained for three minutes.

Demonstration of satisfactory reliability will be completed when one system has operated for 75 cycles with no discrepancy. Between cycles the equipment shall be turned off and cooled to initial conditions. The vibration axes shall be rotated to one of the mutually perpendicular axes every 25 cycles.

Scheduled maintenance or adjustments may be performed between cycles.

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## 4.5.1.8 Other Environmental Tests

In lieu of the environmental tests specified below, vendor certification that all materials, processes, components and systems can withstand the environmental stresses of these tests, will be acceptable. Components, materials, processes and systems which cannot be certified by the Vendor shall be subjected to the following environmental tests per MIL-E-005272B.

- (a) Sand and Dust (Procedure I)
- (b) Salt Spray (Procedure I)
- (c) Fungus (Procedure I)

## 4.5.1.9 Shock

While non-operative, the equipment shall be subjected to two shock machine shocks in each direction of each axis in which the equipment will be subject to shock inputs from shipment and handling. The shock machine shall produce a shock spectrum within a minus 10 percent to a plus 50 percent of the spectrum shown in Figure 8. Upon completion of the tests, the equipment shall be operated and its performance noted. The equipment shall show no failure, malfunction, or out-of-tolerance performance.

4.5.2 Preproduction (Flight Proof) Tests for 10-20403-1, -2, & -3.

Demonstration of satisfactory compliance by the 10-20403 system with the flight proof tests of section 4.5.1 will be adequate flight proof evidence for the -1, -2, and -3 systems.

## 4.5.3 DELETED

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4.5.3 Preproduction (Flight Proof) Test for 10-20403-10 & -11

4.5.3.1 Paragraphs 4.5.1, applies with exception of paragraphs 4.5.1.2 and 4.5.1.7.

4.5.3.2 Vibration

While operating in accordance with section 3.1.2.1.1, the -12 RF Section shall be vibrated in each of three coordinate axes in accordance with the vibration envelopes of Figures 11 and 12. The sinusoidal and random noise vibration shall be applied simultaneously and measured at the points of mounting of the equipment to the structure. Duration of applied vibration shall be one sweep at 1/2 octave per minute (about 17 minutes in each coordinate axes). During the above vibration, the equipment shall operate without failure or malfunction and within the performance limits specified in section 3.1.2.1.2.

4.5.3.3 Vibration

While operating in accordance with section 3.1.2.1.2, the -8 SCO Section shall be vibrated in each of three coordinate axes in accordance with the vibration envelopes of Figures 5 and 6. The sinusoidal and random vibrations shall be applied simultaneously and measured at the points of mounting of the equipment to structure. Duration of applied vibration shall be 15 minutes in each axis. During the above vibration, the equipment shall operate without failure or malfunction and within performance limits specified in section 3.1.2.1.2.

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4.6

## BAC RECEIVING INSPECTION AND FUNCTIONAL TESTS

### NOTE:

Reference should be made to paragraph 4.1.3 for general description of BAC testing.

4.6.1

### RECEIVING INSPECTION

The Quality Control Department will inspect all articles received for specification conformance as indicated below.

4.6.1.1

PACKAGING AND PACKAGE IDENTIFICATION - For compliance with Section 5.0.

4.6.1.2

IDENTIFICATION MARKING - For compliance with applicable paragraph of Section 3.0.

4.6.1.3

CONSTRUCTION - Compliance with the requirements of the specification regarding outline and mounting provisions and obvious defects or damage.

4.6.1.4

WORKMANSHIP - General quality of workmanship as required by Section 3.0.

4.6.1.5

GENERAL TESTING - BAC reserves the right to test the articles in accordance with any of the requirements of this specification. Inspection may be conducted by either of the following methods with the right reserved to interchange methods (a) and (b) as warranted by the percentage of failures.

(a) Individual (100%) Inspection.

(b) Sampling Inspection.

4.6.1.6

REJECTED ARTICLES OR LOTS - Articles and/or lots not accepted by BAC Inspection may be resubmitted for complete inspection after the Vendor has given the articles a remedial treatment which will satisfy BAC Inspection that articles meet the requirements of this specification. Before resubmission, full particulars concerning previous rejections and the action taken to correct original defects shall be furnished BAC Inspection. Reworked articles and/or lots shall be submitted for acceptance separately from newly produced items.

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4.6.2      ACCEPTANCE FUNCTIONAL TESTS

4.6.2.1      Functional test of the 10-20403. -1, -2, -3, -10, and -11  
FM/FM Telemetry Systems shall be in accordance with D2-4862-1.

4.6.2.2      Functional tests of the -4, -6, -7, -9, -12, and -13 RF  
Packages shall be in accordance with D2-4862-1, paragraphs  
6.3.2, 6.4.2, 6.4.3, 6.5, 6.6, 6.7, 6.8, 6.10, and 6.12.

4.6.2.3      Functional tests of the -5 and -8 VCO Packages shall be in  
accordance with D2-4862-1, paragraphs 6.3.1, 6.4.2, 6.4.3,  
6.9, 6.10, and 6.11.

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## 4.7 QUALITY CONTROL

### 4.7.1 PRODUCTION CONTROL

The Vendor shall be responsible for the constancy of production and shall guarantee that all production units shall be at least the equal of the unit or units offered for preproduction tests. Sufficient control of all materials, components, and sub-assemblies shall be exercised to assure that the articles, when completed, shall be uniform and meet the requirements of the specification.

### 4.7.2 INSPECTION

The work under this specification shall at all times be open for inspection to authorized representatives of the Buyer and the Government. Records, facilities, supplies, and services required for this inspection shall be furnished by the Vendor. The inspectors may require replacement of items which are defective or which do not otherwise meet specification requirements. An inspection system acceptable to BAC and to the Government shall be maintained by the Vendor. Records of all inspection work by the Vendor shall be available to authorized Buyer and Government personnel.

### 4.7.3 EVIDENCE OF ACCEPTANCE TEST

All items that have successfully passed the acceptance test shall be so identified by the application of a test acceptance stamp.

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5.0

## PREPARATION FOR DELIVERY

### NOTE:

Unless otherwise specified in the purchase order, packaging, packing, and marking for shipment to BAC shall be in accordance with paragraphs 5.1 and 5.3, as applicable. Articles for shipment to other than BAC shall be in accordance with paragraphs 5.2 and 5.3, when so specified in the purchase order.

5.1

## DELIVERY TO BAC

5.1.1

### UNIT PACKAGING

Individual containers shall be so constructed as to allow removal of parts for inspection purposes without destroying the container or labels affixed thereon. If a paper wrapping is used for the unit, acid free paper shall be used. When possible, the container shall afford equal protection to the unit therein after the container has been opened, the unit removed, inspected, and replaced, and the container resealed without the use of special tools. Packaging of all units shipped to BAC shall provide sufficient protection to ensure delivery of the units to BAC without damage and in a condition capable of meeting the requirements of this procurement specification.

5.1.2

### INTERMEDIATE PACKAGING

Where size or other considerations result in more than one unit being packaged within a shipping carton, the units shall be individually packaged within the shipping carton. This requirement is mandatory in order to provide suitable protection and positive identification, during storage and handling after removal of the individual units from the major shipping carton. Any deviation from the above required individual packaging requirement must in all cases be approved by BAC prior to shipment of the parts from the Vendor's factory.

5.1.3

### SPECIAL INSTRUCTIONS

If the article requires special attention during receiving inspection, installation, and operation, the Vendor shall attach a removable instruction tag to each article. If non-obvious characteristics require an article to be given special handling, the Vendor shall notify BAC and also attach a removable instruction tag to each article.

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5.2

DELIVERY TO OTHER THAN BAC

NOTE:

If the Vendor has Packaging Team Authority, for the item(s) covered by this specification, preservation and packaging shall be in accordance therewith; otherwise, the Vendor will be furnished detailed preservation and packaging instructions in accordance with the Boeing Packaging Team Authority.

The above information applies to domestic shipments where limited and extended storage are involved and for overseas shipments.

For domestic shipments intended for immediate use, see paragraph 5.1.

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5.3

## MARKING

5.3.1

### MARKING TEXT

All containers, including individual packages and outer cartons, shall be marked with the following information in the order listed:

- (a) Vendor Part Number
- (b) Nomenclature
- (c) Quantity
- (d) Buyer's Purchase Order Number
- (e) Vendor's Name and Address
- (f) Vendor's Trade Mark (Optional)
- (g) Date Packed
- (h) Retest or Reinspection Date (if applicable)
- (i) Use Before (Date) (if applicable)
- (j) Serial Number (if applicable)

#### NOTE:

Reinspection and "use before" date markings shall be in accordance with ANA Bulletin 405.

5.3.2

### BAC SPECIFICATION NUMBER

The BAC specification number shall not appear on the individual packages or on the outer shipping carton unless specified on the purchase order.

5.3.3

### SPECIAL MARKING INSTRUCTIONS

When so specified in the purchase order, all units shall have individual and intermediate packages and shipping containers marked in accordance with MIL-STD-129.

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6,

NOTES

INTENDED USE

The airborne FM/FM telemetry systems (10-20403, -1, -2, -3, -10 and -11) described herein will be used to collect, process and transmit data measurements such as vibration, temperature, etc., of a ballistic missile.

6.1.1

The 500 hour operating life will be accumulated largely during test and checkout operation on the bench and during various stages of missile assembly. When operating on bench tests the equipment be un-enclosed and subject to normal laboratory environment. When installed in the missile compartment, forced ventilation will be provided during pre-launch only. The final and most critical operating cycle will consist of approximately 30 minutes operation at ground environment followed by operation during approximately 3 1/2 minutes under conditions as described in 3.1.1.3.2. The equipment will not be recovered.

6.1.2

The equipment must be able to survive normal handling and shipping including air transport in un-heated, un-pressurized aircraft. Extended storage is not anticipated.

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6.2

**APPROVALS AND CERTIFICATIONS**

All approvals and certifications will be recorded in the approval block of the specification drawing. Where deviations from the specification design requirements have been granted to the Vendor, the specification shall be either revised to reflect the necessary deviations and the original requirements issued under a different specification dash number, or revised by adding an appropriate note to the approval column on the specification drawing indicating that deviations have been granted.

6.2.1

Design Proposal Approval

Assignment of this approval means that the Vendor's design proposal information submitted in compliance with D2-3971 has been approved by the Engineering Department. It does not indicate approval or acceptance of the Vendor's detail design or manufactured article.

6.2.2

Final Approval

Assignment of this approval to the Vendor's article means that:

- (a) The required preproduction exhibits, submitted in accordance with 6.4.4, have been approved.
- (b) Customer approval has been granted or was not required.
- (c) The article is approved for installation, operation, and delivery to Boeing's customer.

6.2.3

Tentative Approval

Assignment of this approval to the Vendor's article means that:

- (a) The required preproduction exhibits, submitted in accordance with 6.4.4, have been approved.
- (b) Customer approval is required and is pending.
- (c) The article is approved for installation and operation.

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## NOTE:

Final approval and tentative approval are only "type approvals" and do not relieve the Vendor of the responsibility to assure that each article complies with all specification requirements.

6.2.4

## Flight Certification

Assignment of this certification to the Vendor's article means that:

- (a) The required preproduction exhibits have not yet been approved.
- (b) There are no operational limitations.
- (c) The article is cleared for installation on a limited number of missiles.

6.2.5

## Limited Certification

Assignment of this certification to the Vendor's article means that :

- (a) The required preproduction exhibits have not been approved.
- (b) There are definite operational limitations.
- (c) The article is cleared for ground testing and installation on a limited number of missiles.

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6.3 DEFINITIONS AND ABBREVIATIONS

NOTE:

Abbreviations appearing in this specification document are in accordance with ALL-STD-12A.

6.3.1 Specification Document

The specification document which contains all the requirements of the article except those shown on the specification control drawing.

6.3.2 Specification Control Drawing

A supplemental drawing which contains the general outline and other physical requirements of the article and upon which the approval status is recorded.

6.3.3 Boeing Procurement Specification

The specification document and the supplementary specification control drawing.

6.3.4 Buyer

The Materiel Department of the Boeing Airplane Company or its designated representative.

6.3.5 Vendor

The manufacturer and/or manufacturer's agent supplying or quoting on the specification article.

6.3.6 System Components

Any piece of equipment which constitutes a component part of the overall system.

6.3.7 Articles: Unit: Assembly: Part: System:

All refer to the equipment defined by the procurement specification.

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6.3.8 Boeing Airplane Company

Boeing Airplane Company, or a subcontracted company which has been granted design responsibility and responsibility for the maintenance of procurement specifications.

6.3.9 End-Product

The overall article defined by the procurement specification including dash numbered components, if any; however, if a specification covers a number of articles which, though related, are functionally independent of each other and are not intended for use as an integrated assembly, each of the articles shall be considered as an end-product.

6.3.10 Reliability

For the purposes of this specification, reliability is defined as the probability of successful completion of operation during the period immediately preceding flight, and during flight.

6.3.11 Discrepancy

Any condition where the equipment fails to operate or where operation is out of the limits of the specification when the equipment is subjected to the operational and environmental conditions of the specification.

6.3.12 Channel

An electrical transmission circuit which is required to convey the magnitude of a data measurement from a single data source.

6.3.13 FM/FM

Denotes frequency modulation of the subcarriers by the sources of intelligence and frequency modulation of the RF carrier signal by the subcarriers.

6.3.14 RF - Radio Frequency

6.3.15 IRIG - Inter-Range Instrumentation Group

6.3.16 SCO - Subcarrier Oscillator

6.3.17 VSWR - Voltage Standing Wave Ratio

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6.3.18

## Individual Tests

Acceptance tests which are performed on every item shipped (100 percent inspection).

6.3.19

## Sampling Tests

Acceptance tests which are performed on a lot basis (less than 100 percent inspection).

6.3.20

## Component Tests

Preproduction tests which are performed on the individual "black boxes" or subassemblies of a system rather than on the complete system.

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## 6.4 DATA REQUIREMENTS

### 6.4.1 Correspondence Initiated by Vendor

#### 6.4.1.1 Correspondence Identification

All correspondence, drawings, design information, and other related material concerning this specification shall be identified by this specification number. For example:

REFERENCE: 10-XXXX-X (Part number and dash number)  
BOEING SPECIFICATION CONTROL PART NUMBER

This identification may be hand-lettered on each piece of data and need not appear on the Vendor's original.

#### 6.4.1.2 Addressing

All information and communications transmitted from the Vendor to the buyer shall be directed to the attention of the appropriate personnel within the particular purchasing department which has requested proposals and/or placed purchase orders.

#### 6.4.1.3 Quantities Required

All communications shall be furnished in the following quantities:

- (a) All correspondence (except preproduction test data)  
..... 3 copies
- (b) Drawings, sketches, wiring drawings  
..... 3 copies or  
1 reproducible
- (c) Preproduction test data  
..... 5 copies
- (d) Preproduction Discrepancy Reports and  
Acceptance Test Summaries ..... 1 reproducible

### 6.4.2 Classification of Data

#### 6.4.2.1 Government Security

Vendors shall not mark drawings and data with such classifications as "Confidential" or "Secret", unless such classification is mandatory by authority of applicable United States Government security regulations.

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6.4.3                      Exhibits Required in Vendor's Design Proposal

6.4.3.1                    General Requirements

6.4.3.1.1                Part Number - A specific part number shall be assigned each article for which a design proposal is submitted. The BAC specification control part number shall not be adopted as a Vendor's part number.

NOTE:

The specification control part number of the article may be the same as the SPECIFICATION CONTROL DRAWING number without any dash number suffix (e.g., 10-00000); however, the specification control part number article may sometimes consist of the SPECIFICATION CONTROL DRAWING number followed by a dash number (e.g., 10-00000-2).

6.4.3.1.2                Exceptions or Deviations - The Vendor shall include a list of exceptions or deviations taken to the specification and the reason for these exceptions.

6.4.3.1.3                Deleted

6.4.3.1.4                Qualification by Similarity - When the article described in this specification is similar to an article previously manufactured by the Vendor and used by BAC, and is constructed of identical materials and/or components and processes, certified test reports of such similar articles and certification that the same or improved construction is used may be submitted with the Vendor's design proposal. BAC reserves the right to reject all or any part of such data and require the testing as specified. Acceptance of the data will depend on adequate evidence that the specified article will pass the same tests as the article covered by the reports.

6.4.3.1.5                Deleted

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6.4.3.2                      Specific Exhibits Required

The seller shall furnish to the Buyer, with his bid submittal, the specific exhibits required in the statement of work document D2-3971.

6.4.3.2.1                      Deleted

6.4.3.2.2                      Deleted

6.4.3.2.3                      Deleted

6.4.3.2.4                      Deleted

6.4.3.2.5                      Deleted

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## 6.4.4 DATA REQUIRED FOR TENTATIVE AND/OR FINAL APPROVAL

6.4.4.1 PREPRODUCTION ARTICLES - The articles which successfully passed the preproduction ~~qualification~~ tests.

6.4.4.2 TEST REPORTS - Test reports which are certified by the signature of an officer or official of the Vendor's company or subcontracted testing laboratory, and which follows the format of MIL-T-9107, except as noted below shall be submitted in accordance with paragraph 6.4.

- (a) The Vendor shall submit to the Buyer either individual test reports or a collective report of the results obtained from subjecting the specified article to the preproduction tests listed in Section 4.0. Unless the ~~qualification~~ testing is unusually complicated, a single collective report is preferred.

In order to expedite the approval of the article, it is requested that interim reports in triplicate be submitted to the Buyer throughout the preproduction testing. These will be used for an initial review only and need not be in the final formal report form.

- (b) Test reports from Vendor's and/or their subcontractors shall include a detailed and qualifying description of the test procedures and a detailed summary of the test results. The reports shall also include a complete description of the test machines and/or instruments and shall include reproductions of all laboratory test data sheets dated and identified on all equipments submitted to ~~qualification~~ tests. Graphic, tabular and photographic presentations shall be used to completely illustrate the way the test was conducted and to verify the results obtained from the test. These exhibits shall be submitted to the Buyer so that he can determine that the article being tested does meet the specification and that the testing agencies' conclusions are supported by adequate data.
- (c) Test reports shall clearly identify the relation of the data to the requirement it is intended to satisfy.
- (d) When revised test report material is submitted, it shall be so marked as to clearly distinguish it from previously submitted material. This provision is necessary as an aid to librarians or other non-technical personnel who must keep filed copies of test reports up to date.

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## 6.4.4.2 (Cont'd)

The use of revision system similar to that employed in Boeing Procurement Specification documents is encouraged wherein the nature of each change is explained on a "Revision" page, and an index of effective pages reflects the current effectivity of each page.

- (e) Beginning with the date of the initiation of actual flight proof testing, a complete test log must be kept of all maintenance, calibration, modification, testing, design changes, etc., relative to or performed on each of the test parts. This log is to form a part of the flight proof test reports and must be available to the Buyer at any time. All discrepancies occurring must be entered together with all pertinent information concerning the failures. Cross references shall be made to the Detail Discrepancy report required by paragraph 6.4.5 of this specification.
- (f) During the test, data shall be recorded of the critical performance parameters of the equipment, particularly those which provide indication of impending failure or unacceptable shift of calibration. Due to the serious consequences of extended delays to a procurement program, the vendor should be urged to take as much pertinent data as possible over and above the specification requirements. Such data might assist in rapidly determining the cause of any impending failure and might enable analysis and correction with minimum delay.
- (g) No tests conducted prior to the time indicated on the Vendor's test schedule will be allowed as evidence of flight proof unless specifically authorized by the Buyer.

## 6.4.4.3

Deleted

## 6.4.4.4

Production Drawings

The supplier shall furnish the data listed below. This data is necessary in order to meet contract requirements and shall be kept up-to-date concurrently with changes to the part or parts.

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6.4.4.4 (Cont'd) Original delivery of the below shall be made not later than 15 days subsequent to completion of the individual design or not later than 90 days before delivery of the first article, whichever occurs first.

Forward with letter of transmittal to

Boeing Airplane Company  
Seattle Division  
P. O. Box 3866  
Material Department  
Seattle 24, Washington

- (a) One vandyke or autpositive (autpositive preferred) copy of each assembly and detail drawing applicable to the part or parts specified on the purchase order.
  - (1) Each assembly and detail drawing shall be prepared in accordance with the requirements of the latest issue of MIL-D-5028 in effect at date of suppliers quotation. Drawing nomenclature shall be in accordance with MIL-STD-28.
  - (2) Vandykes or autpositives shall be prepared in accordance with Specification MIL-D-5480.
- (b) Show applicable Government contract number and Boeing purchase order number in letter of transmittal.

## 6.4.4.5 Acceptance Test Procedures

A description in document form of acceptance test procedures and equipment for the approval of the Engineering Department.

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6.4.5

## DISCREPANCIES

6.4.5.1

**DISCREPANCY PROCEDURE** - Should any discrepancy occur during the preproduction testing, the test shall be stopped. An analysis shall be made of the cause of the discrepancy and changes proposed as necessary to correct the difficulty. The failure shall be entered in the test log of paragraph 6.4.4.2(e) together with an analysis of the cause of failure and the course of action planned to eliminate the difficulty. The Vendor shall forward immediately to the Buyer the Preproduction Discrepancy Report (See paragraph 6.4.5.2).

6.4.5.1.1

**Design Changes Unnecessary** - In the event that the Vendor determines that no design change is necessary, full justification for such action shall be forwarded at once to the Buyer. The Vendor may continue the test; however, he bears full responsibility for so doing until Boeing approval is given of the Vendor's decision. The Buyer will forward comments to the Vendor within 15 days after receipt of the Preproduction Discrepancy Report. If BAC disapproves the Vendor's course of action, a mutually acceptable solution must be agreed upon.

6.4.5.1.2

**Design Changes Required** - Should the Vendor elect to make design changes as a result of a failure, descriptive information must be forwarded immediately to the Buyer. This data shall include a description of how the change was developed, the nature of the change itself, justification that the change will provide adequate design margin to preclude recurrence of similar failures, and evidence that the change will not cause detrimental interaction with other portions of the equipment under test, resulting in other failures at a later date. Redesign equipment items may be required for examination at Boeing. The Buyer shall forward comments to the Vendor within 10 days. If Boeing disapproves, a mutually acceptable change must be agreed upon. The Vendor may incorporate the redesign in preproduction test parts and begin the test, but he must not release the change for manufacturing use on items to be delivered under contract to Boeing until receipt of the Buyer's approval.

6.4.5.2

**DISCREPANCY REPORTS** - A detailed report shall be made by the Vendor on each discrepancy occurring during preproduction tests. The report shall include details relating to the failure and corrective action taken to enable Boeing to fully evaluate the problem. Photographs shall be included wherever they contribute to the understanding. The report shall also include a reproducible copy of a completed "Preproduction Discrepancy Report" form, see Figure 1, for each discrepancy occurring during the test. Discrepancy Report forms will be supplied by the Buyer or the Vendor using the BAC format.

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## 6.5 CHANGES TO THE ARTICLE OR SPECIFICATION

### 6.5.1 BAC Changes

Changes to the procurement specification may be initiated by the Boeing Airplane Company to revise, add or delete requirements. All Vendors affected will be notified of such changes as soon as possible. All changes will be confirmed in a subsequent revision of the specification.

#### 6.5.1.1 Orally - Stated Changes

Any orally stated change or intention to change the requirements of the procurement specification is unofficial.

#### 6.5.1.2 Official Changes

All changes to the procurement specification will be accomplished by revision of the SPECIFICATION CONTROL DRAWING and/or SPECIFICATION DOCUMENT.

#### 6.5.1.3 Interim Notice of Specification Change

In instances where a specification must be changed immediately, the change may be authorized by a letter or telegram of intention from the Boeing Material Department. In this case, the letter or telegram of intention will be followed by a substantiating revision to the specification.

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## 6.5.2 Vendor Changes

### 6.5.2.1 Specification Changes

Changes to the procurement specification may be requested by the Vendor or others concerned and, if approved, will be confirmed in a subsequent revision of the specification.

### 6.5.2.2 Changes After Design Proposal Approval

After EAC design proposal approval has been granted, it shall be necessary to obtain written approval of EAC prior to the incorporation of any change affecting physical, functional, or structural interchangeability or weight.

### 6.5.2.3 Changes After Tentative and/or Final Approval

After tentative and/or final approval have been granted, it shall be necessary to obtain written approval of EAC prior to the incorporation of any change whatsoever. When a change has been approved, revised drawings and data shall be sent to EAC. Revision letters or numbers and dates shall be used to indicate the revision status of each original drawing or data sheet. Where part number changes are not required, serial number effectivity must be noted for all changes.

Additional or repeat flight proof testing may be required at the discretion of the Engineering Department.

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6.6 SEQUENCE OF BAC-VENDOR NEGOTIATIONS

6.6.1 REQUEST FOR QUOTATION

The Vendor will receive a copy of the procurement specification as part of the bidder's package and an invitation to submit a design proposal. This may include a request for estimate of cost and delivery schedules.

B

6.6.2 DESIGN PROPOSAL SUBMITTAL

The Vendor's design proposal shall be prepared in accordance with D2-3971 and shall be sent at the time of bid submittal to the Buyer who will route it to the Engineering Department.

B

6.6.3 DPA ISSUANCE

Upon evidence that the proposed article will meet specification requirements the Vendor will be notified that Design Proposal Approval has been assigned.

B

6.6.4 Deleted

B

6.6.5 PURCHASE ORDER

After DPA has been issued, the Buyer may issue the purchase order.

B

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6.6.6

## Finalizing Design

The Vendor may then proceed with efforts toward final design configuration and manufacture. In addition, the Vendor shall prepare a preproduction test plan and submit to the Buyer who will route the data to the Engineering Department for approval. This plan shall include a test schedule per a form provided by the Buyer. When the Vendor receives approval of his test plan, he may proceed with preproduction testing.

6.6.7

## Critical Design Review

A critical design review shall be accomplished by BAC Engineering on the equipment at the time the production configuration is established and prior to the start of flight proof testing. This shall be a detail analysis of each part of the equipment with respect to its adequacy to fulfill its function. The Vendor shall make available to BAC sufficient data necessary to perform this review. Design data to be furnished will include but not be restricted to:

- (a) Production drawings per 6.4.4.4.
- (b) Circuit diagrams
- (c) Detail reliability Program
- (d) Detailed numerical reliability analysis in which the potential operational reliability figure of the equipment is calculated. An explanation of the basis for selection of the reliability figures for the individual parts shall be included.
- (e) The Interference Control plan in accord with and within the time specified per paragraph 3.4 of GM 07-59-2617A. The above data shall be furnished on a keep-up-to-date basis.

6.6.8

## Notification of Testing

The vendor shall notify Boeing at least three days prior to conducting any tests in which data is to be used for flight proof purposes. (At this time the Vendor must supply a revised test schedule.) The Buyer will notify the vendor if Boeing witnesses are required at any or all such tests.

6.6.9

## Submittal of Test Data

The Vendor shall send preproduction data to the Buyer who will in turn route it to the Engineering Department.

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6.6.10

## Granting Approval

If the preproduction data indicates that the article will meet all specification requirements, either tentative or final approval will be assigned.

### NOTE:

Ordinarily, an article must be assigned tentative or final approval before it can be installed on production assemblies. Purchase orders will stipulate that no articles shall be shipped before approval has been received. The Buyer, however, may apply for limited or flight (operational) certification and then authorize limited shipment to sustain production until approval is assigned. This application for certification must be accompanied by the data required under paragraph 6.4.4.5.

6.6.11

## Notification of Approval

The Vendor will be notified of a certification or approval issued to his article by means of a letter signed by the Buyer and followed up with a revised copy of the specification Control Drawing. When it is urgent to release the manufactured article for shipment to the Buyer, advance notice of certification or approval may be telephoned, or telegraphed to the Vendor by the Buyer.

6.6.12

## Approval of Acceptance Test Procedure

The Vendor's Acceptance Test Procedure, as required by paragraph 6.4.4.5 must be approved by the Engineering Department prior to the shipment of the Vendor's articles.

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6.7 SPECIFICATION WAIVERS

6.7.1 A waiver is granted from the requirements of paragraph 3.1.1.2.1 to allow the out-of-tolerance conditions specified below. (Ref. 2-6432-10-41 dated 11-17-61).

6.7.1.1 GM 07-59-2617A, Figure 1 (A.1)  
Broadband Conducted Interference

RFI Condition:

320 Kc - 1 db out  
425 Kc - 3.5 db out

6.7.1.2 GM 07-59-2617A, Figure 1 (A.2)  
Broadband Conducted Interference

RFI Condition:

1.5 Mc - 2 db out (+28 v. line)  
1.94 Mc - 2 db out (-28 v. line)  
12.0 Mc - 1 db out (Signal lines)  
20.5 Mc - 2 db out (Signal lines)

6.7.1.3 GM 07-59-2617A, Figure 1 (B.2)  
CW Radiated Interference

RFI Condition:

1.66 Kmc (7th Harmonic)-4.8 db out  
1.89 Kmc (8th Harmonic)-2.8 db out

6.7.1.4 GM 07-59-2617A, Figure 1 (C.2)  
Transmitter Keydown

RFI Condition:

206 Mc - 37 db out  
214 Mc - 7 db out  
227 Mc - 26 db out  
229.5Mc - 27 db out  
245 Mc - 13 db out  
710 Mc - 2 db out  
1.42 Kmc - 13 db out  
1.66 Kmc - 52 db out  
1.89 Kmc - 37 db out  
2.12 Kmc - 20 db out  
2.35 Kmc - 27 db out  
3.30 Kmc - 14 db out

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6.7.1.5

GM 07-59-2617A, Figure 1 (C.2)  
Antenna Conducted Keydown

RFI Condition:

195.5 Mc - 30 db out  
216.5 Mc - 19 db out  
218.0 Mc - 23 db out  
235.5 Mc - 19 db out  
450.0 Mc - 11 db out  
676.0 Mc - 25 db out  
1.13 Kmc - 9 db out  
1.36 Kmc - 5 db out  
1.57 Kmc - 37 db out  
1.80 Kmc - 37 db out  
2.03 Kmc - 17 db out  
2.25 Kmc - 29 db out  
2.93 Kmc - 1 db out

6.7.1.6

GM 07-59-2617A, Figure 1 (C.3)

6.7.1.6.1

Transmitter Crossmodulation.  
Transmitter No. 1 30% amplitude modulation and transmitter  
No. 3 normal modulation.

RFI Condition:

195.5 Mc - 30 db out  
200.4 Mc - 32 db out  
218.0 Mc - 13 db out  
220.5 Mc - 23 db out  
223.0 Mc - 11 db out

6.7.1.6.2

Transmitter Crossmodulation  
Transmitter No. 1 normal modulation and transmitter  
No. 3 30% amplitude modulation.

RFI Condition:

195.5 Mc - 30 db out  
201.0 Mc - 34 db out  
217.0 Mc - 18 db out  
221.0 Mc - 32 db out  
223.0 Mc - 18 db out  
236.5 Mc - 36 db out  
680.0 Mc - 3 db out  
689.0 Mc - 2 db out

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6.7.1.6.3 Transmitter Crossmodulation  
Transmitter No. 2 30% amplitude modulation and transmitter No. 3 normal modulation.

TXI Conditions:

201.0 Mc - 26 db out  
206.0 Mc - 38 db out  
211.0 Mc - 12 db out  
223.2 Mc - 17 db out  
225.4 Mc - 9 db out  
226.0 Mc - 29 db out  
229.0 Mc - 22 db out  
235.8 Mc - 30 db out  
238.2 Mc - 32 db out  
241.0 Mc - 6 db out

6.7.1.6.4 Transmitter Crossmodulation  
Transmitter No. 2 normal modulation and transmitter No. 3 30% amplitude modulation.

TXI Conditions:

201.0 Mc - 38 db out  
206.0 Mc - 38 db out  
210.0 Mc - 11 db out  
223.0 Mc - 18 db out  
225.0 Mc - 25 db out  
226.0 Mc - 29 db out  
229.0 Mc - 17 db out  
241.0 Mc - 2 db out

6.7.2 The following workmanship deviations are granted from the requirements of paragraph 3.1.1.1.5 (Ref. 2-6425-01-78 dated 10-16-62, 2-6425-01-82 dated 10-16-62 and TWX 2-4437-1-6229 dated 10-5-62).

<u>Assembly</u>	<u>Deviations</u>	<u>Applicable Para. of D5-E300</u>
Chassis, R.F. Package	A. Etched boards shall be per UED Spec. J-169	Para. 3.3.1
	B. External Connectors shall be identified in accordance with UED drawings.	Para. 3.21
	C. Shielded wire installation shall be per UED drawings.	Para. 4.8.6
Chassis, Sub-carrier Package	A. Etched boards shall be per UED Spec. J-169.	Para. 3.3.1

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<u>Assembly</u>	<u>Deviation</u>	<u>Applicable Para. of RI-2300</u>
	B. External connectors shall be identified in accordance with UED drawings.	Para. 3.21
	C. Forming of leads, such as lead length and stress relief on components, shall be per UED drawings.	Para. 4.6.3
	D. Wiring shall be per UED drawings.	Para. 4.8.2
Subcarrier Oscillator	A. Etched boards shall be per UED Spec. J-169.	Para 3.3.1
	B. Forming of leads, such as lead length, stress relief, and distance from component to bend, shall be per UED drawings.	Para. 4.6.3
	C. Deviation to scalloped, swaged terminals shall be per UED workmanship standards manual, para. 3.3.	Para. 4.4.3
	D. Minimum pad diameter shall be per UED drawings.	Para 3.8.4
Power Regulator (PR-10)	A. Etched boards shall be per UED Spec. J-169.	Para. 3.3.1
	B. Forming of leads, such as lead length, stress relief, and distance from component to bend, shall be per UED drawings.	Para. 4.6.3
	C. Deviation to scalloped, swaged terminal, terminals shall be per UED workmanship standards manual, para. 3.3.	Para. 4.4.3
	D. Minimum pad diameter shall be per UED drawings.	Para. 3.8.4
Power Amplifier (PA-11)	A. External connectors shall be identified in accordance with UED drawings.	Para. 3.21
	B. Shielded wire installation shall be per UED drawings.	Para. 4.8.6
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<u>Assembly</u>	<u>Deviations</u>	<u>Applicable Para. of D5-2380</u>			
Transmitter (TR-19)	C. Forming of leads, such as lead length and stress relief on components, shall be per UED drawings.	Para. 4.6.3			
	D. Forming of leads to terminals and lugs, no wrap.	Para. 4.6.5			
	A. External connectors shall be identified in accordance with UED drawings.	Para. 3.21			
	B. Hardware shall be per UED drawings.	Para. 3.2.1			
	C. Shielded wire installation shall be per UED drawings.	Para. 4.8.6			
	D. Forming of leads, such as lead length and stress relief on components, shall be per UED drawings.	Para. 4.6.3			
	E. Forming of leads to terminals and lugs, no wrap.	Para. 4.6.5			
	F. Swaged terminals shall not be used. Terminals shall be per UED workmanship standards manual, para. 3.3.	Para. 4.4.3			
	G. Etched boards shall be per UED Spec. J-169.	Para. 3.3.1			
	Power Supply (PS-15)	A. Etched boards shall be per UED Spec. J-169.	Para. 3.3.1		
B. External connectors shall be identified in accordance with UED drawings.		Para. 3.21			
C. Shielded wire installation shall be per UED drawings.		Para. 4.8.6			
D. Forming of leads, such as lead length, stress relief and distance from components to bend, shall be per UED drawings.		Para. 4.6.3			
E. Deviation to swaged terminals, terminals shall be per UED workmanship standards manual, para. 3.3.		Para. 4.4.3			
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TABLE I  
CHANNEL INPUT DATA

FM/FM TELEMETRY SYSTEM 10-20403, -1, -2, -3, -10 & -11

<u>Channel</u>	<u>Input Voltage Range</u>	<u>SCO Input Impedance*</u>
12 (10.5 kc)	0 to + 5 volts	at least 100K ohms ( $\pm 10\%$ )
13 (14.5 kc)	0 to + 5 volts	at least 100K ohms ( $\pm 10\%$ )
A (22.0 kc)	0 to + 5 volts	at least 100K ohms ( $\pm 10\%$ )
C (40.0 kc)	0 to + 5 volts	at least 100K ohms ( $\pm 10\%$ )
E (70.0 kc)	0 to + 5 volts	at least 100K ohms ( $\pm 10\%$ )

\* A nominal input impedance greater than 100K ohms is preferred and shall be considered as a design objective. Any nominal input impedance attained greater than 100K ohms shall be stable to within  $\pm 10\%$  of that nominal input impedance.

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# DISCREPANCY REPORT

No. 1

2 DATE OF DISCREPANCY		6 NO. TEST PARAGRAPH		10 TIME METER MRS. MODE READING		11 BOEING P.O. NO.		12 VENDOR'S NAME & ADDRESS	
3 VENDOR DISCREPANCY NO.		7 PART. TEST TIME ON PARTICULAR TEST		13 BOEING SPEC. CONTROL PART NAME		14 BOEING SPEC. CONTROL PART NO.		15 VENDOR ASSEMBLY NO.	
4 PREPARED BY		8 TOTAL TEST TIME		15 VENDOR ASSEMBLY NAME		16 VENDOR ASSEMBLY NO.		17 VENDOR ASSEMBLY SERIAL NO.	
5 VENDOR APPROVAL		9 BOEING WITNESS		18 VENDOR PART NAME		19 VENDOR PART NO.		20 SPECIFIC PART LOCATION	
21 DESCRIPTION OF DISCREPANCY									
22 ANALYSIS OF DISCREPANCY									
23 CORRECTIVE ACTION									
24									
25 PRODUCT MODEL									
26 PRODUCT SYSTEM									
27 USED ON ASSEMBLY									
28 FINAL RPT. NO. (LIBRARY REFERENCE)									
29 REFERENCE INFORMATION									
30 TEST RESPONSIBILITY (NAME OF DESIGN GROUP)									

FIGURE 1

THE RESPONSIBLE DESIGN GROUP SHALL COMPLETE THIS SECTION AND FORWARD TO THE RELIABILITY DATA GROUP WITHIN SEVEN (7) DAYS.

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# SPECIFICATION DOCUMENT PAGE

## PREPRODUCTION DISCREPANCY REPORT INSTRUCTIONS FOR FIGURE 1

This form shall be used to report the details of every discrepancy, malfunction or failure observed on any item, parts, material or assembly during preproduction testing. Photographs shall be included whenever they contribute to the understanding.

The form will be originated by the observer of the discrepancy, malfunction, or failure. It must be complete and accurate as possible.

The form will be reviewed for completeness in the area in which it is originated. After completion, the form will be routed as indicated at the bottom of the form.

1. Serial number of the report.
2. Date discrepancy was detected.
3. Cross reference to vendor report on same discrepancy.
4. Name of observer originating report.
5. Name of person who checks report for completeness and approves.
6. Number of preproduction test paragraph being run when discrepancy occurred.
7. Total running time (hours and minutes) accumulated at time discrepancy occurred for test being run as indicated in item 6.
8. Total preproduction test time (hours) accumulated for all test paragraphs completed prior to this discrepancy.
9. Name of Boeing witness who observed this discrepancy.
10. This block to be completed only for those preproduction test paragraphs which call for more than one operating mode.
11. Number of Boeing purchase order which buys the item being qualified.
12. Name of vendor and the city in which the item is being qualified.
13. Name of part as given in the title of the Boeing procurement specification document.

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**FIGURE 16**

14. Number of the Boeing Procurement Specification Drawing with dash numbers as applicable.
15. Name of the Vendor assembly which is discrepant.
16. Assembly number of the Vendor assembly which is discrepant.
17. Serial number of the Vendor assembly which is discrepant.
18. Name of the specific part in the Vendor assembly which is discrepant.
19. Part number of the specific part in the Vendor assembly which is discrepant.
20. Location or reference designator for the specific part in the Vendor assembly which is discrepant.
21. A specific narrative description of background symptoms, environment, actual test values read, operator's comments, and cause of discrepancy if known.
22. Narrative analysis of discrepancy which is made to determine corrective action to be taken.
23. Narrative account of corrective action taken to correct discrepancy and prevent recurrence.
- 24-30 For Boeing use only.
31. Routing instructions.

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30 300

**Name of Company Performing Test**

REVISION: DATE

TEST 2

## TEST DESCRIPTION AND RESULTS

### List in Order of Completion

**NOTE: Summarize each failure**

for each test reference including cause and action taken. Completely identify each failed part.

8	OPERATING TIME
---	----------------

FOR E.C.H

Hours Min. Secs.

FIGURE 2

U.S. 2040's  
PAGE 5

[illegible]

# SPECIFICATION DOCUMENT PAGE

## FIGURE 2a

### ACCEPTANCE OR FUNCTIONAL TEST SUMMARY INSTRUCTIONS FOR FIGURE 2

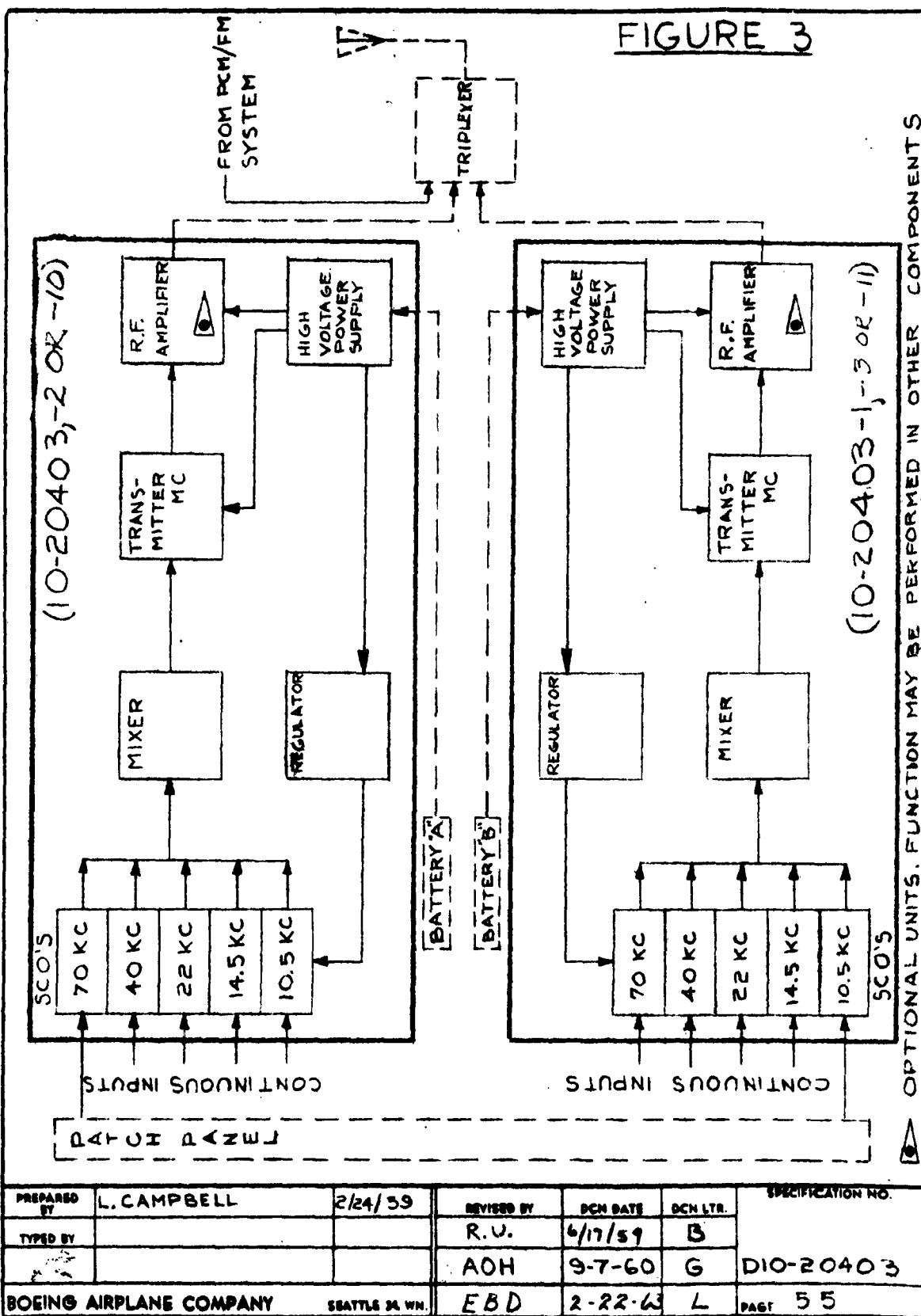
This form shall be used to report the completion of each test reference or functional test paragraph by number and date in chronological order. All test references shall be listed whether discrepancies occurred or not and shall include operating time and cycles.

The details of every discrepancy, malfunction, or failure observed on any item, part, material, or assembly occurring during functional testing shall be reported in proper order. Photographs shall be included whenever they contribute to the understanding.

1. Name of manufacturer or vendor of item reported on.
2. Name of equipment or item as given in the title of the Boeing Procurement Specification Document.
3. Assembly or part number of the vendor item being reported on.
4. Serial number of the vendor item being reported on.
5. Number of the Boeing Procurement Specification Document and revision date.
6. Number of the test reference or functional test paragraph and the date on which it was completed.
7. List names of functional tests completed opposite each number and state actual test values read. If no discrepancies occurred during test, so indicate. If discrepancies did occur summarize them opposite the appropriate test number. Each summary shall include cause, if known, and action taken. Any failed parts shall be completely identified.
8. Operating time and cycles accumulated shall be listed for each test reference number.
9. Routing instructions.

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FIGURE 3

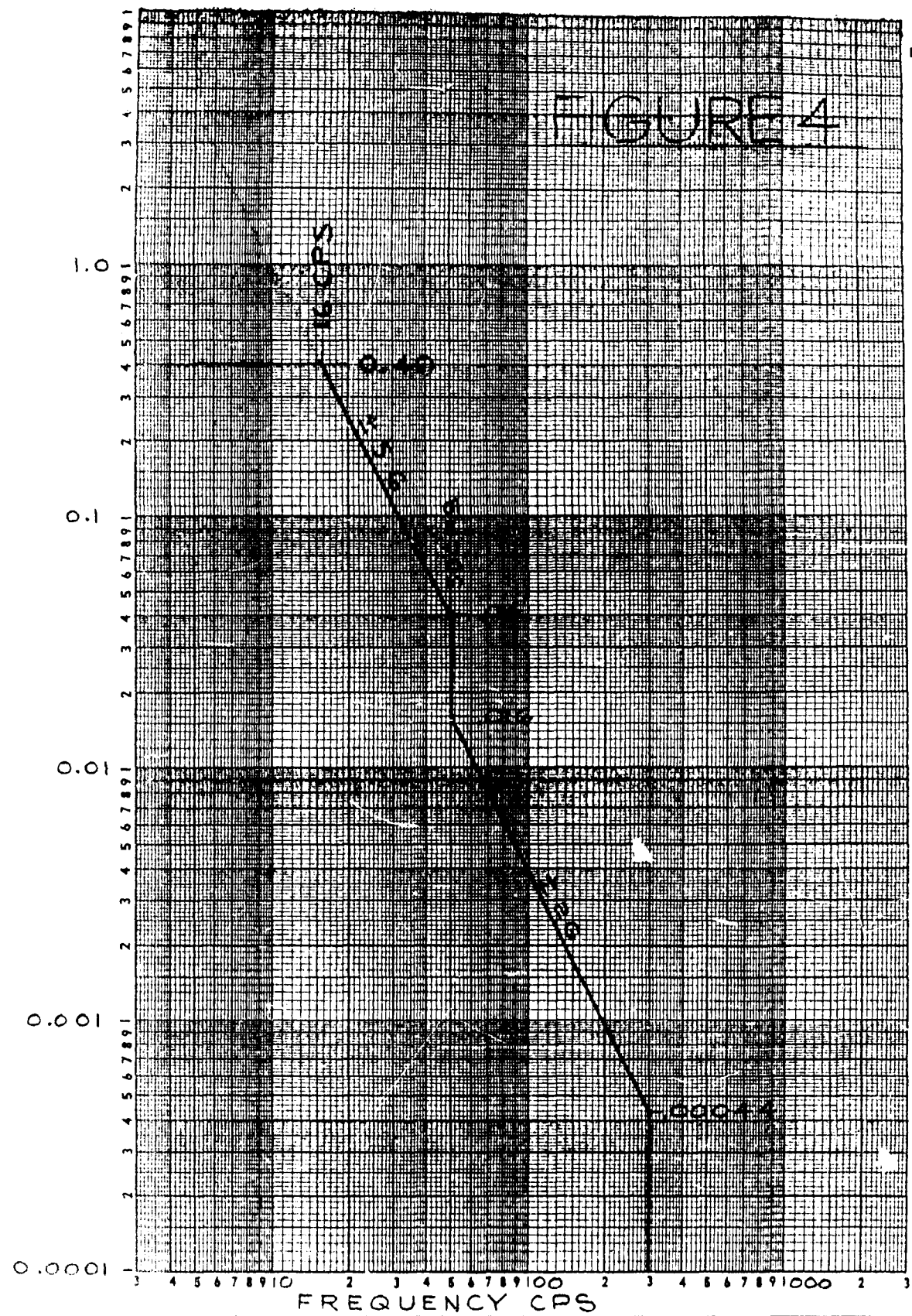


OPTIONAL UNITS. FUNCTION MAY BE PERFORMED IN OTHER COMPONENTS

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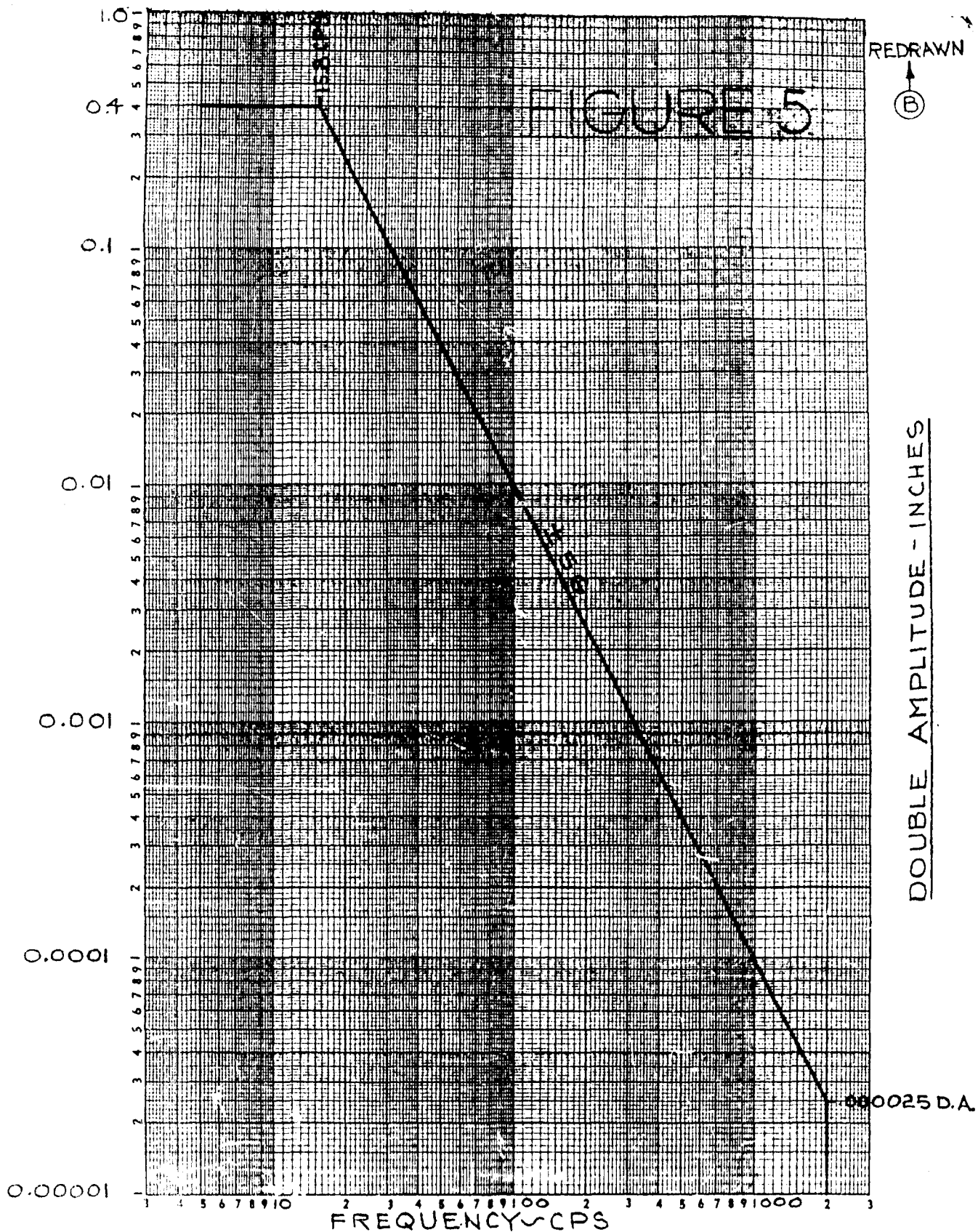
# FIGURE 4



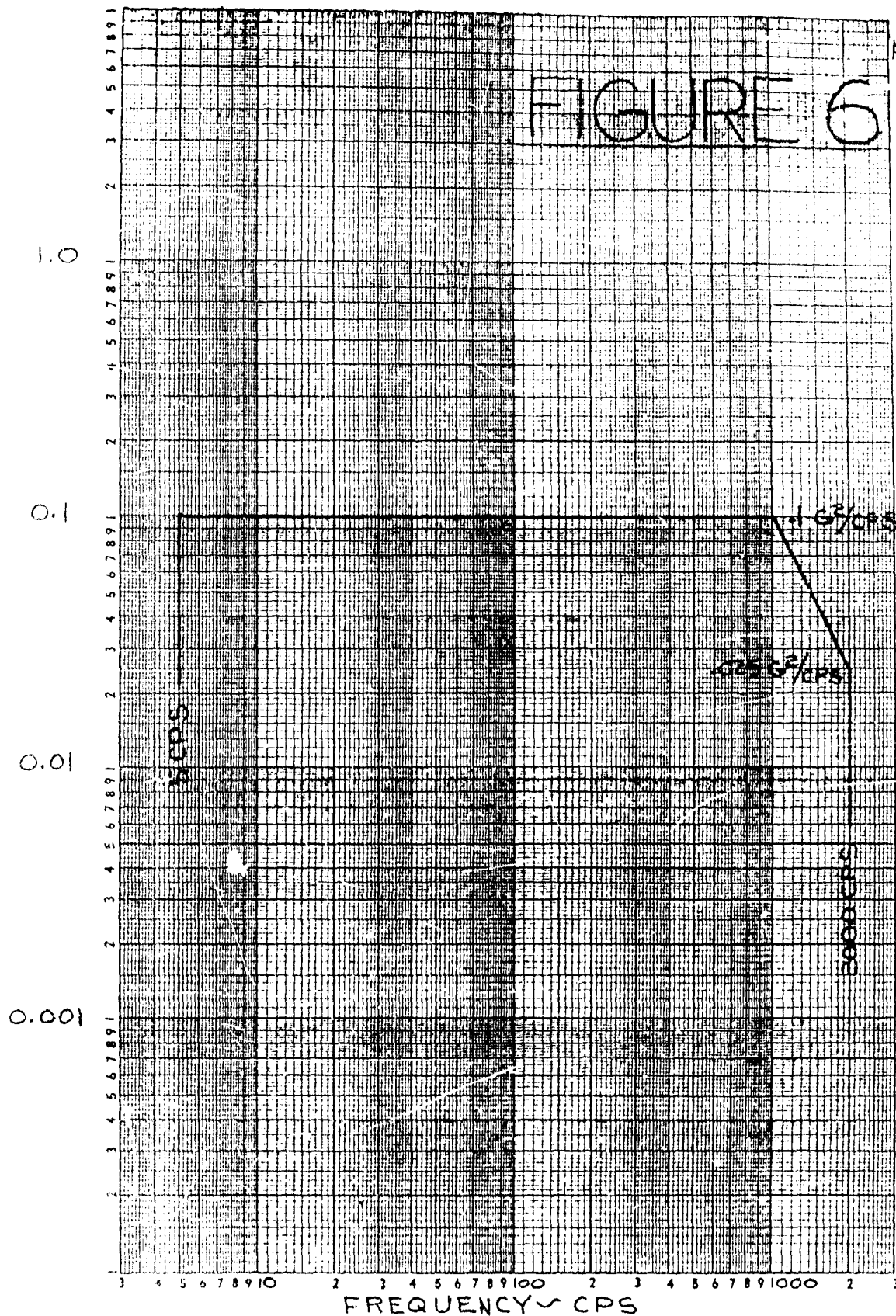
DOUBLE AMPLITUDE INCHES

CALC	CAMPBELL	5/4/59	REVISED	DATE	SINUSOIDAL VIBRATION	SPEC. NO.
CHECK			B	6/17/59	ENVELOPE FOR EQUIPMENT	D10-20403
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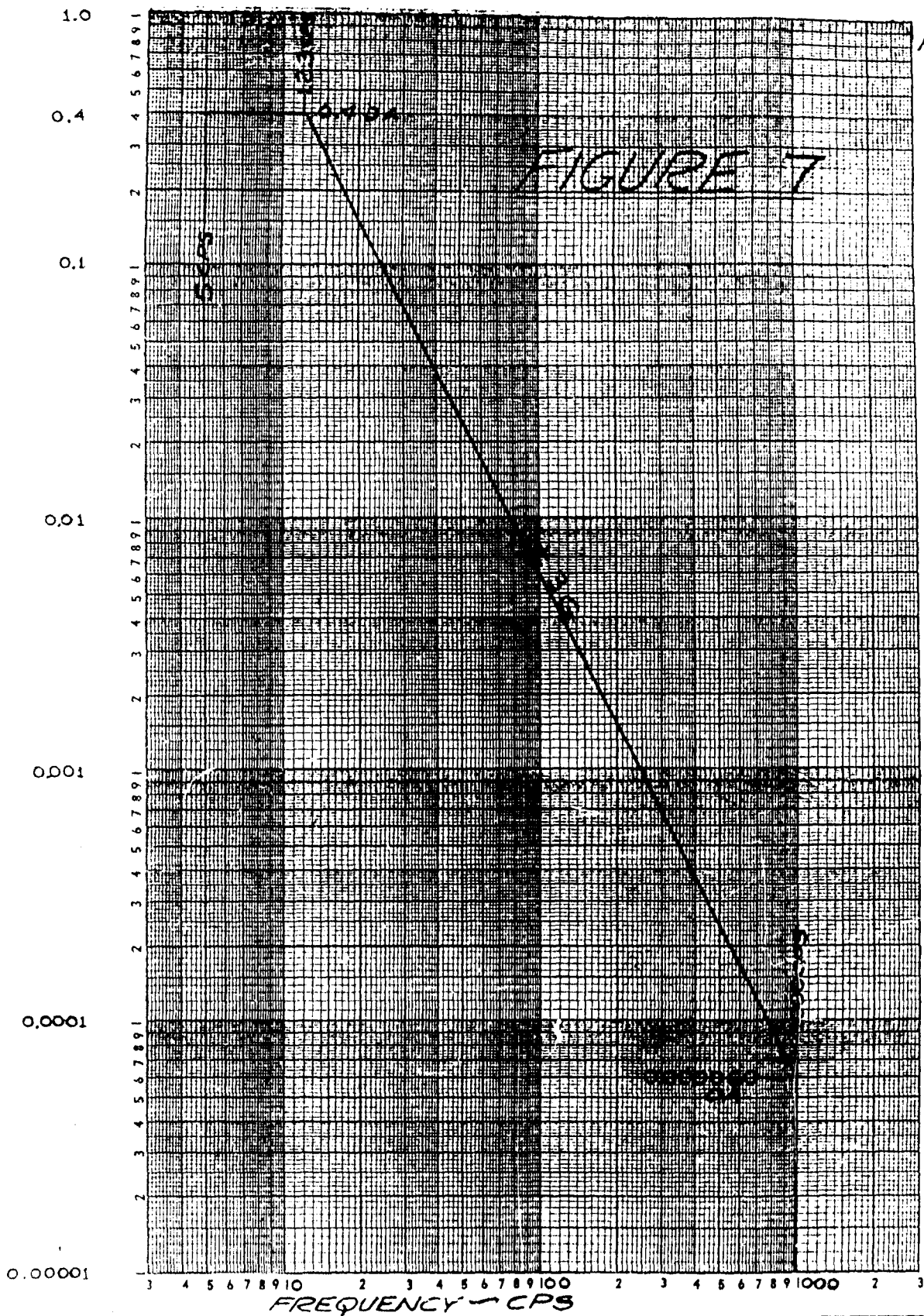
CALC	CAMPBELL	5/6/59	REVISED	DATE	SINUSOIDAL VIBRATION DESIGN	SPEC. NO.
CHECK			B	7/17/59	TEST ENVELOPE FOR	
APPD					EQUIPMENT OPERATIVE	D10-20403
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REDRAW  
 (B)  
 ACCELERATION POWER SPECTRAL DENSITY - G²/CPS

CALC. CHECK DESIGNED APPROVED	L. CAMPBELL 2/5/59	REVISED B	DATE 2/5/59	RANDOM VIBRATION DESIGN & TEST ENVELOPE FOR EQUIPMENT OPERATIVE BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON	SPEC. NO. D10-204-03 PAGE 58
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DOUBLE AMPLITUDE - INCHES

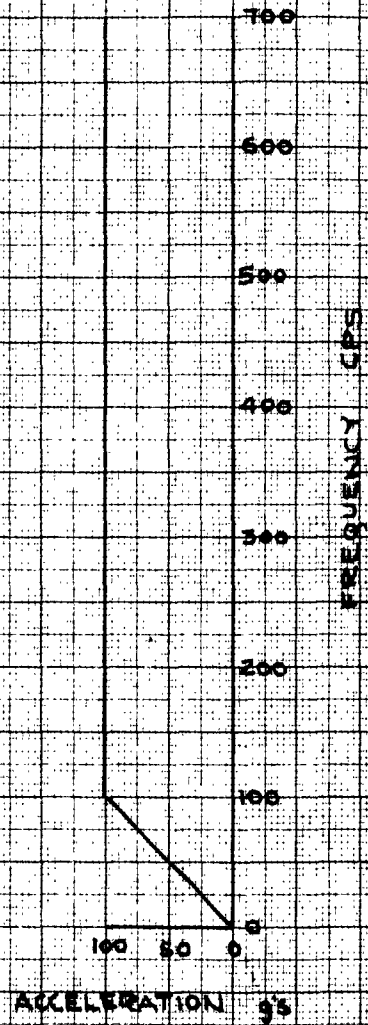


REDRAW  
B

DOUBLE AMPLITUDE - INCHES

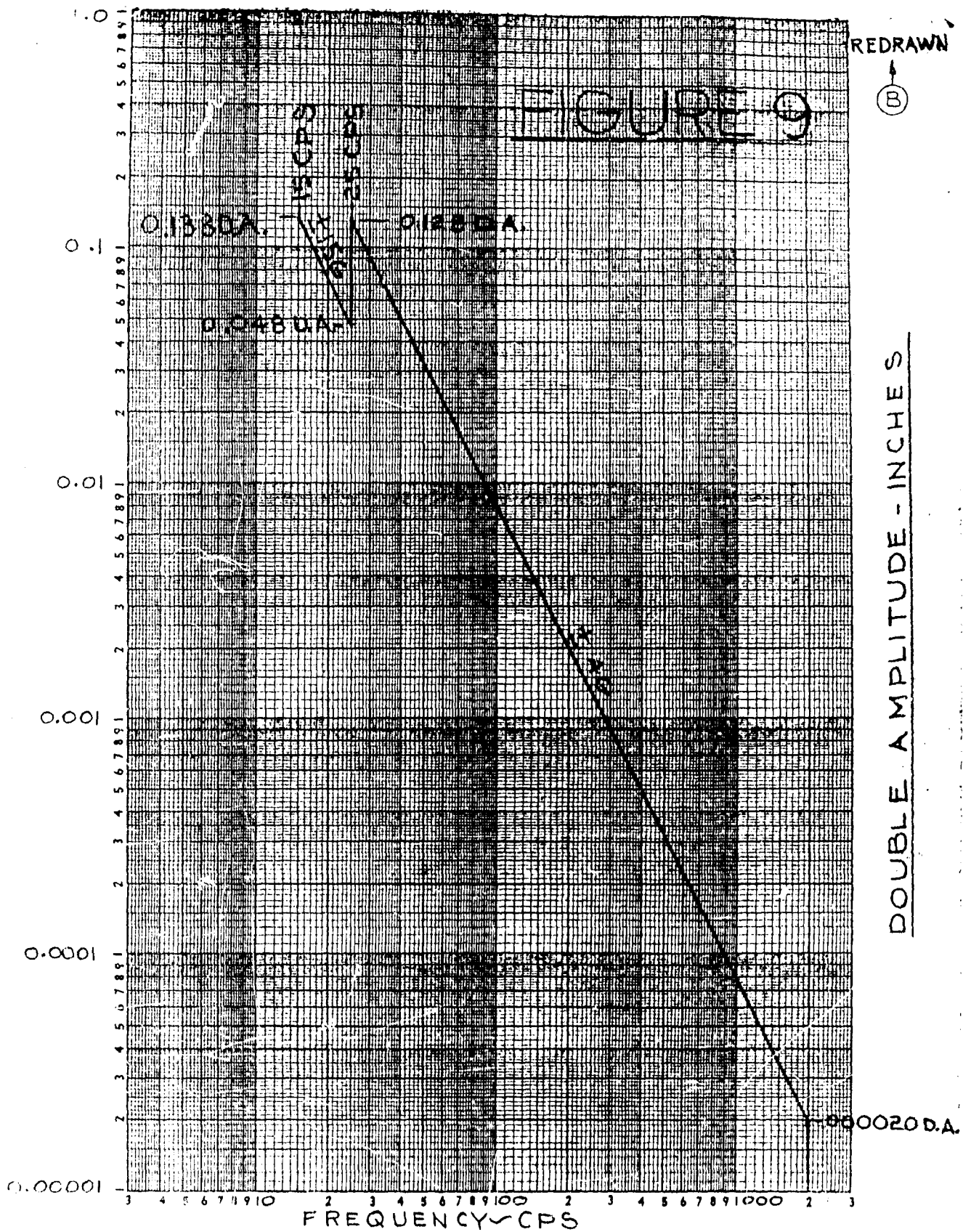
<div> <div>CALC</div> <div>CHECK</div> <div>APPR</div> <div>AP'D</div> </div>		<div>REVISED</div> <div>B</div>	<div>DATE</div> <div>5/25/9</div>	<div>SINUSOIDAL OPERATIVE</div> <div>ACCEPTANCE TEST ENVELOPE</div>	<div>SPEC. NO.</div> <div>010-20403</div>
				<div>BOEING AIRPLANE COMPANY</div> <div>SEATTLE 24, WASHINGTON</div>	<div>PAGE 59</div>

# FIGURE 8



CALC		REVISED	DATE	SHOCK TEST SPECTRUM EQUIPMENT INOPERATIVE	FIG. 8
CHECK		P <sub>3</sub>	2/22/71		D10-20403
APR					PAGE
APR					60
				BOEING AIRPLANE COMPANY	



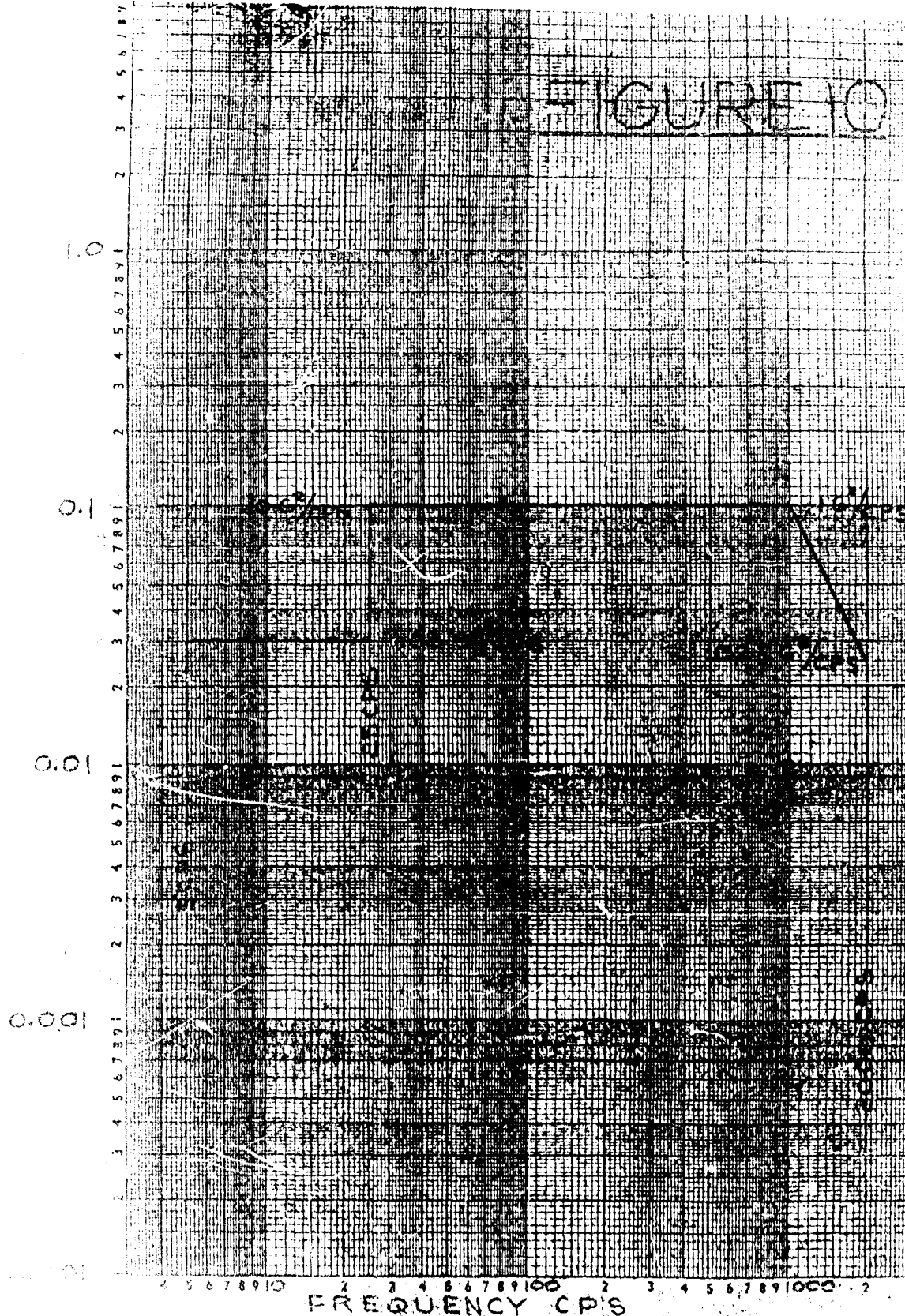


CALC	L. CAMPBELL	5/1/59	REVISED	DATE	SINUSOIDAL VIBRATION CURVE (SIMULATED FLIGHT ENVIRONMENT)	SPEC. NO.
CHECK			B	7/1/59		DIO-20403
APPR						PAGE 61
APPR						
BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON						

REDRAWN

(P)

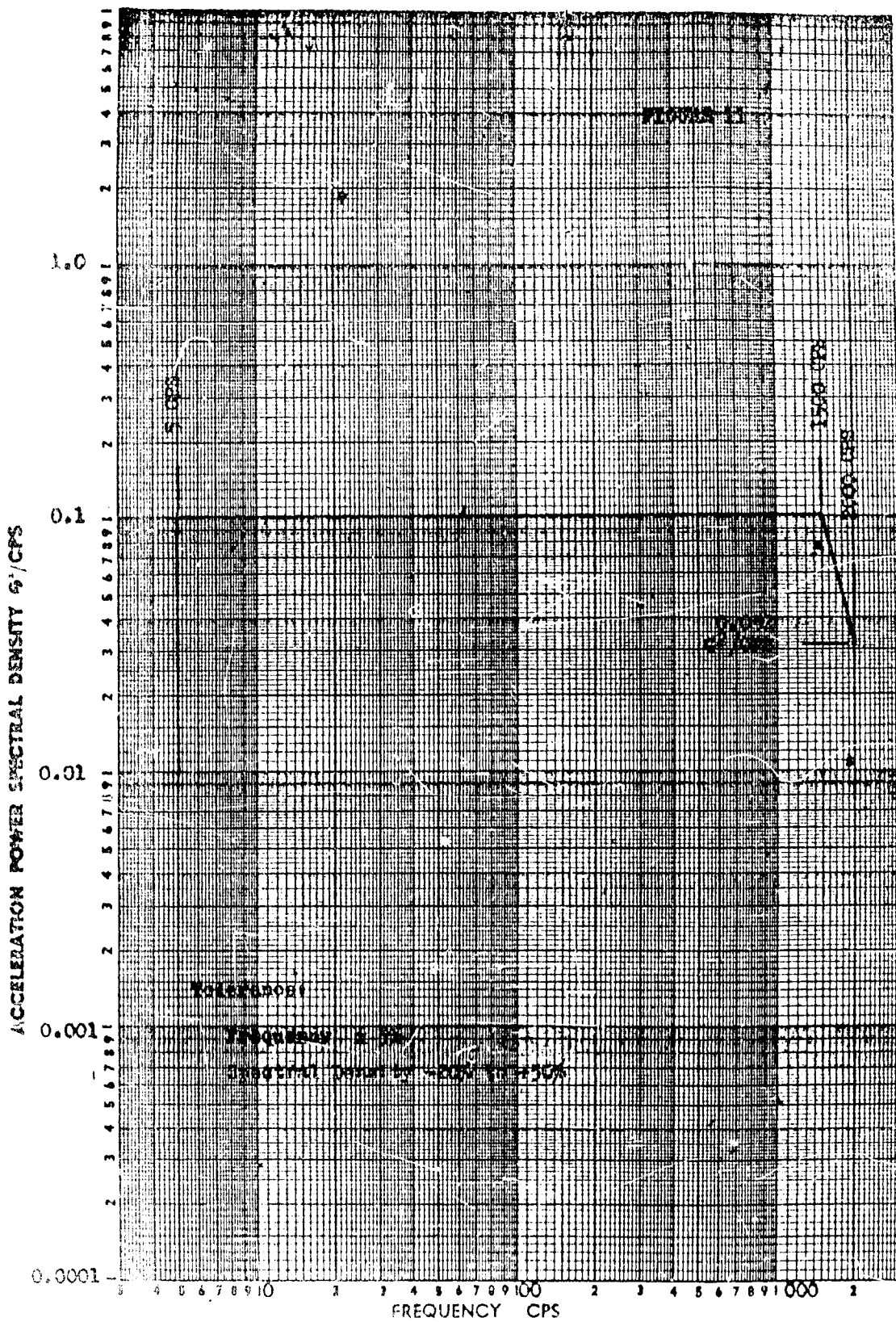
# FIGURE 10



ACCELERATION POWER SPECTRAL DENSITY G²/CPS

FREQUENCY CPS

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CALL	11/11/54	REVISED		RANDOM VIBRATION ENVELOPE FOR EQUIPMENT OPERATIVE (INSTRUMENTATION COMP.)	Spec. No.
CHECK	11/11/54	11/11/54			D10-20403
APPROV.	11/11/54	11/11/54			PAGE 63

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